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Maryland Medical Journal

Focused Issue:

Performing arts medicine

JANUARY 1998

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The editorial board of the *Maryland Medical Journal* welcomes comments, criticisms, recommendations, and observations from all its readers. Please submit letters to: Editor, *Maryland Medical Journal*, 1211 Cathedral Street, Baltimore, MD 21201-5585

Reader finds journal helpful in doctor/patient relationship

I am writing this brief note as a retired internist to compliment you and your staff on your September 1997 issue of the *Maryland Medical Journal*. I selected this issue because of the variety of subjects covered; I found the information presented in such a concise manner, with few wasted words, to be most stimulating and of great help in my role as patient catalyst while enhancing the doctor/patient relationship by making the patient smarter. Incidentally, this is the only journal I receive in retirement.

James A. Roberts, M.D.
Berlin, Maryland ■

BPQA application renewal fills doctor with dread

As July rolled around this year, bringing cookouts, the beach, and renewal time for those of us in the second half of the alphabet, I was not as full of dread as two years ago because I recalled reading an assurance from the BPQA [Board of Physician Quality Assurance] that we would not have the foolish questions of the past to answer several times on the same application. As I dug right in, the first eight questions went well and were all legitimate (assuming the Social Security number was for identification purposes). Then I got to question nine: year of graduation. I think I've given that to them before; it hasn't changed in 25 years. Then question ten: school of graduation. That hasn't changed either. I suppose the school could have changed its name, but why anyone would go through the time and expense of repeating medical school, thereby changing the answers to questions nine and ten escapes me.

I'm not sure why they need my DEA number. I don't have to prescribe controlled substances, therefore don't even have to have a DEA number (federal physicians can't get a DEA number unless they are also moonlighting); ditto question 12. Likewise, I don't know why they care where else I'm licensed, active, or otherwise. If it is to notify the other boards should they discipline me, wouldn't they want to know about inactive licenses as well? All in all, though, not as hateful as some years past.

Then Part B. I know the legislature has tasked the planners with gathering information, but here we go again on the second page. My medical school hasn't moved. I promised them four years ago that if I changed my gender I would let them know. I don't know how I could change my year of birth or race. My Medicare UPIN is probably none of their business, but available to them from other sources, as I would presume my Medical Assistance number would be, if I had one. Likewise, I can't fathom why my office fax number or e-mail address is any of their business. Are they counting office faxes and e-mail addresses for planning purposes? Will I have to have a certificate of need for my office automation equipment? Couldn't they just ask whether I had one and how many?

Then the HCAO asks for much of the same information for the third time. Surely, BPQA should be able to share it with them (or they could ask HRPC). And what do you suppose they'd do if I listed my occupation as farmer?

Now, either this information is important enough that these organizations should have retained it in a usable, recallable form from the last two renewals, it is unimportant information that they don't need this time either, or we are being repetitively tasked with recording information which some data entry clerk is entering, but not making available for subsequent review. That smacks of perpetual employment for office staff. Even the MVA doesn't ask me for my birthday, gender, or eye color every time I get a driver's license! This is unreasonable paperwork unnecessarily heaped on us by an organization(s) not doing, or not capable of doing, a professional job.

And to top it off, where does all this information go? It would appear to go to a bank drop-off much like colleges use. Otherwise, there wouldn't be a "For Bank Use Only" box. I know banks are really good at maintaining databases; aside from the potential for mischief inherent in sending SSN, DEA number, UPIN, etc. to a bank, it seems to me there's a potential for contracting out to the bank the job of remembering my gender, race, birthday, school of graduation, where it is located, and the other stuff from one renewal to the next.

I suppose the remedy is legislative and I know there is a reluctance to oppose your regulator when your job is on the line, but I for one think enough is enough and we need to do something—even if it's only to buy the BPQA some decent database software!

Richard C. Moore, MD, MPH
Family physician practicing in Danville, Virginia. ■

BPQA responds

The writer is correct about the redundancy on the renewal form. We regret that the physician had to spend the time to resubmit what had been given to the Board of Physician Quality Assurance two years earlier. However, we are currently working with the Maryland Health Resources Planning Commission on a prefilled data sheet that renewing physicians can simply verify or change and hope to have in place in the near future.

Also, please be assured that this does not translate into perpetual employment for staff. On the contrary, because of the mandatory personnel cutbacks of last year's Senate Bill I, several form revisions have been postponed.

Very truly,
J. Michael Compton,
Executive Director, Board of Physician Quality Assurance ■

"Can Florida Become the First State in the United States to Take Heart Disease out of First Place?"

The authors of the article, "Can Florida Become the First State in the United States to Take Heart Disease out of First Place?," published in the supplement to the November/December *Maryland Medical Journal*, are to be congratulated for their laudable goal of decreasing the mortality and morbidity of coronary heart disease. However, their goal to "make Florida the safest state in the Union in which to have an acute myocardial infarction" distracts attention from a more important goal – prevention of myocardial infarction through smoking cessation, diet, and exercise.

By focusing attention on *first place*, the measure of age-specific death rates is de-emphasized. The authors state that Maryland had the seventh lowest age-adjusted mortality from myocardial infarction. Maryland's ranking as seventh lowest is not as important as determining what can be done to decrease this rate.

By introducing the concept of first place the authors obscure the demographic background important in determining appropriate prevention programs. How do the rates differ from rural to urban areas by age-specific levels? How do the rates differ by age-specific, occupation-specific categories? How do the rates differ by education-specific, age-specific categories? This information is necessary to prioritize the type of intervention needed to lower the age-specific death rates — not to "move heart disease out of first place." Again, the authors are to be congratulated on their exposition of new ideas for diagnosis and treatment of acute myocardial infarction. The program should be carefully evaluated using appropriate epidemiologic techniques.

Timothy Baker, M.D.
Dr. Baker is a professor in the department of international health, The Johns Hopkins University School of Hygiene and Public Health. ■

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Guest Editorial

Performing arts medicine in Maryland

The Committee on Medicine and the Performing Arts is charged by Med Chi to study the illnesses and injuries to which performing artists are subject, report on the medical aspects of such conditions, and recommend preventive and protective actions that will benefit the artists and their performances.

Most of the articles in this issue of the *Maryland Medical Journal* are based on presentations at conferences hosted by the committee over the last three years. The approach is interdisciplinary; the material will be useful to primary care physicians, specialists, other care-givers, and performers alike. There is useful advice on how to avoid injury from overuse, prescribed or unconventional medications, unhealthy lifestyles, and environmental stresses.

Another committee activity updated in this issue is the Music Medicine Clearinghouse, an expanding fund of information on performing arts medicine that is available through the Med Chi Library for physicians, musicians, educators, and researchers.

It might be asked whether performing artists (here the term includes singers, instrumentalists, dancers, and actors) merit special attention beyond that provided by the existing medical literature and conventional referral and treatment patterns. Surveys of the medical problems of performers reveal important differences in the approach used, for example, for athletes with musculoskeletal injuries seen in a sports medicine clinic or for keyboard operators with overuse injuries caused by repetitive small movements.

A performing artist may function normally except in regard to his or her art.[1] Seemingly trivial injuries might be overlooked or dismissed if they do not interfere with the activities of daily living. A detailed history and physical should focus on the patient as a *performer*. If necessary, the physician should examine the patient before, during, and after performing, and include an evaluation of how well the instrument fits the performer rather than vice versa. This approach can uncover subtle disabilities that may severely limit the quality and duration of performance, and curtail training or a professional career.

Performing arts medicine has no hospital residency or fellowship training programs, so physicians need exposure to a sufficient volume of performing artists as patients to accumulate special experience and expertise. Performing arts medicine clinics and programs flourish best in major cultural centers with large performing arts communities and the potential for this critical mass of patient referrals. Marketing fledgling programs to both the medical and arts communities is critical for recognition and growth.

Performing arts medicine needs a multidisciplinary structure. In a survey of 22 performing arts clinics in North America, Pascarelli reported that the range of services available on-site or through a referral network includes specialist help for instrumentalists, dancers, and vocalists, as well as access to primary care, physical and occupational therapy, and psychologic services.[2] Medical directors of clinics were most often neurologists or physiatrists, but also represented were internal medicine, psychiatry, otolaryngology, orthopedics, osteopathic medicine, and rheumatology. About half the directors were current or experformers themselves, perhaps a prerequisite for empathy!

Most of the clinic directors felt that support by mental health services was important because of the relationship between physical injury and psychologic dysfunction.[2] The multiple causes of stress include close scrutiny in training, auditions, competition, and then professional performance; perceived lack of sympathy toward disabled artists; meager financial rewards; and job insecurity coupled with an awareness of poor preparation for alternative careers.

The performing arts help to remind us that we live in a society and not in an economy, but financial backing for clinics cannot be ignored. Although about 200,000 people in the United States earn a living as performers,[3] and in Canada in 1991 performing arts contributed 2% to 3% of the gross domestic product,[4] many programs and clinics are on a precarious financial footing. Pascarelli noted that 19 of 22 clinics surveyed in 1994 were affiliated with hospitals and/or universities.[2] Rapid changes in the medical marketplace will likely lead to pressure on clinics from parent institutions and managed care programs to downsize or to become self-supporting. Cuts in services to the many performers who are poorly paid and under- or uninsured will result unless alternative sources of funding are found. Currently, very little of the funds raised by major arts organizations are directed to performers' health care needs, but the idea of allocating resources to health maintenance to improve productivity (longevity and quality of artistic performance being the "bottom line" in this instance) ought to prove palatable to the administrators and management of opera and dance companies, orchestras, conservatories, and unions.[5]

Health maintenance should start early. Performing artists begin long hours of practice in childhood and, compared with other professions, may suffer more from lack of exercise, poor posture and diet, stress of competition with peers, and dabbling with self-medication and alternative medicine. Lockwood argues, "It would be irresponsible for a football coach to ignore physical conditioning. The same may be true in music pedagogy."[3] So we should encourage scientifically based health maintenance education in our dance and music schools.

A final responsibility of the committee is to cooperate with other groups interested in the functional preparation of artists, maintenance of their physical skills, and rehabilitation after injury and illness. Maryland is a small, densely populated state with major performing arts centers for training and performance—an ideal combination for developing performing arts medicine. At least two programs are in place already. *

As an initial step to link existing clinics and caregivers with performers, the committee will survey Maryland physicians and performing arts organizations to determine the level of interest in setting up a Med Chi-based referral network. We encourage interested physicians to respond to the notice that will appear soon in the *Med Chi Physician.*

Alan J. Sweatman, M.D.
Chair, Committee on Medicine and the Performing Arts

References

1. Brandfonbrener AG. From the editor. *Medical Problems of Performing Artists* 1986;Jun;1:[1p.].
2. Pascarelli EF; Bishop CJ. Performing arts medicine: the status of the specialty within the evolving health care system. *Medical Problems of Performing Artists* 1994; 9:63–66.
3. Lockwood AH. Medical problems of musicians. *N Engl J Med* 1989;320:221–227.
4. Chong J; Zaza C; Smith F. Design and implementation of a Performing Artists' Health Program in Canada. *Medical Problems of Performing Artists* 1991;6:8–10.
5. Brandfonbrener AG. The bottom line: funding arts medicine. *Medical Problems of Performing Artists* 1986;4. ■

*Richard Norris, M.D., National Rehabilitation Center, Bethesda; Scott Brown, M.D., Sinai Rehabilitation Center, Baltimore.

Noise-induced hearing loss and symphony orchestra musicians: risk factors, effects, and management

Paul U. Teie, M.M., M.S., F.A.A.A.

Mr. Teie is an audiologist with the Hearing Assessment Center of Lutherville, Maryland. He is also a professional singer and church musician.

ABSTRACT: *Although industrial and recreational noise have been recognized as potential causes of noise-induced hearing loss for quite some time, it is only recently that the sound levels within a symphony orchestra have been implicated as possible sources of harmful noise levels. Many studies have concluded that not only are dangerous levels of noise present within the symphony orchestra, but there is evidence of noise-induced hearing loss among symphony orchestra musicians. Although hearing protection designed for industrial use may not be appropriate for the special listening needs of professional musicians, recent advances in hearing protection design have made hearing protection practical for this population. Suggestions are made for monitoring and protecting the professional ear.*

Noise causes hearing loss. For decades we have been aware that a single exposure to extremely intense noise, or long-term exposure to less intense noise, can damage the hair cells of the cochlea. The result is a permanent sensorineural hearing loss. Noise-induced hearing loss (NIHL) is characterized by hearing thresholds that are poorest in the range of 3K to 6K Hz, creating a characteristically notched audiometric configuration.

But what is noise? Certainly sound levels present in many industrial contexts qualify. For that reason, the Occupational Safety and Health Administration (OSHA) promulgated a hearing conservation regulation to protect the hearing of industrial workers exposed to potentially harmful levels of noise. Although there is a great deal of individual

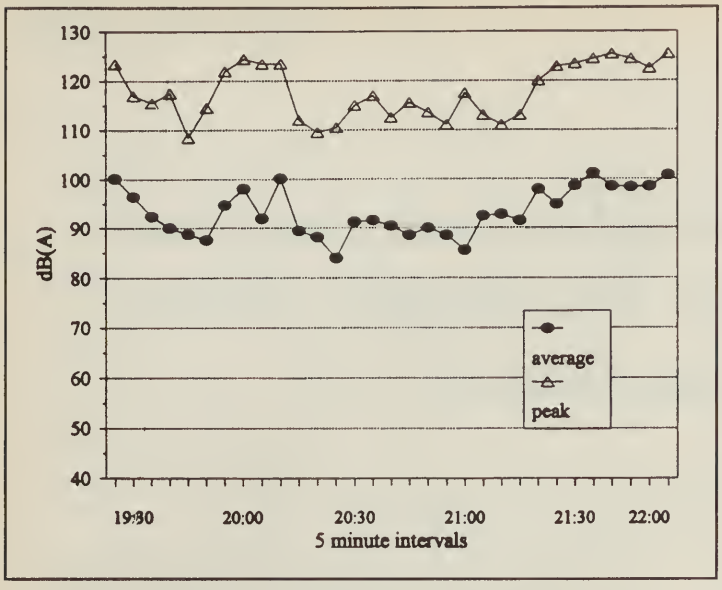

Figure 1. Personal noise exposure of a French horn musician in the orchestra pit; 5-minute interval. Peak mean=114 dB(A); Leq mean=94 dB(A).

variation in susceptibility to NIHL, the 85 dB(A) eight-hour time-weighted average action level put forth in the OSHA hearing conservation amendment is a reasonable standard for determining potentially damaging noise. At this level, implementation of a hearing conservation program is required in the United States. It is estimated that this standard would be expected to protect the hearing of 80% to 90% of the working population.

Throughout this article, "dB(A)" refers to a weighting protocol used to measure broad-band noise. A-weighted noise measurement integrates the various component frequencies of a broad-band acoustic signal and quantifies the noise in roughly the same way that the healthy human ear hears, that is, most sensitive for the mid (speech) frequencies (approximately 500 to 4,000 Hz) and less sensitive for the very low and very high frequencies. A-weighting is the most common weighting scheme used in industrial noise-level measurement.

Recreational noise has also been implicated in producing NIHL. Use of firearms, attendance at stock car and drag races, and use of personal cassette players can expose persons to harmful levels of noise.[1] It is also clear that the noise levels at many rock-and-roll concerts and clubs are dangerous.[2-4] Many rock-and-roll musicians, including Pete Townsend of *The Who* and Ted Nugent, have been very forthcoming about the detrimental effects lifelong exposure to amplified music has had on their hearing.

But what of the music heard in the concert hall? Can the music of Brahms, Tchaikovsky, and Mahler be considered *noise*? A growing body of evidence suggests that, in terms of the cochlea, that is exactly what it is. As beautiful as these sounds are, at the level of the sensory end-organ they are simply noises, some of which may be intense enough to cause permanent hearing damage.

Over the last 10 years, literature has shown that not only is the noise exposure of musicians intense enough to cause permanent NIHL, but also that audiometric evidence of NIHL exists among this population. At the same time, advances in hearing protection technology have made ear-level hearing protection practical for most, if not all, at-risk musicians.

This article reviews some of the recent literature regarding noise exposures of symphony orchestra musicians and the effects this noise may have on their hearing. The functional effects of a high-frequency NIHL are discussed, and practical suggestions for hearing protection and management of the professional ear are provided.

Noise exposures of symphony orchestra musicians

Sound levels within the symphony orchestra have been shown by many investigators to exceed allowable OSHA criteria. Jansson and Karlsson evaluated noise exposures for symphony orchestra musicians based on a 40-hour work week (the criterion used in Sweden). They found

Table 1. Sound Levels of Various Instruments

Violin	84-103 dB (A)
Cello	84-92 dB (A)
Bass	75-83 dB (A)
Piccolo	95-112 dB (A)
Flute	85-111 dB (A)
Clarinet	92-103 dB (A)
French horn	90-106 dB (A)
Oboe	80-94 dB (A)
Trombone	85-114 dB (A)
Xylophone	90-92 dB (A)

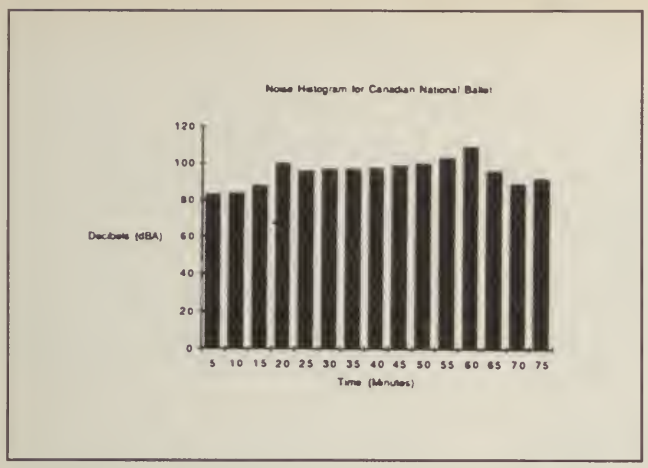

Figure 2. Noise histogram during a relatively quiet etude recorded from the flute player's right shoulder.

that, depending upon the location of musicians within the orchestra, players received a maximum allowable noise dose in 10 to 25 hours of working time.[5]

In a study of noise exposures in the Chicago Symphony Orchestra, Royster et al. found mean noise exposures, adjusted for an eight-hour day, to be just over the OSHA action level of 85 dB(A).[6] They predicted that, based on this exposure, a small amount of NIHL would be expected from the population at large. However, they noted that, for individuals with higher susceptibility to NIHL and whose exposures were at the higher end of the observed levels, a significant NIHL could be expected. Because of the very delicate and specific hearing needs of the professional musician, any decrement in hearing is undesirable.

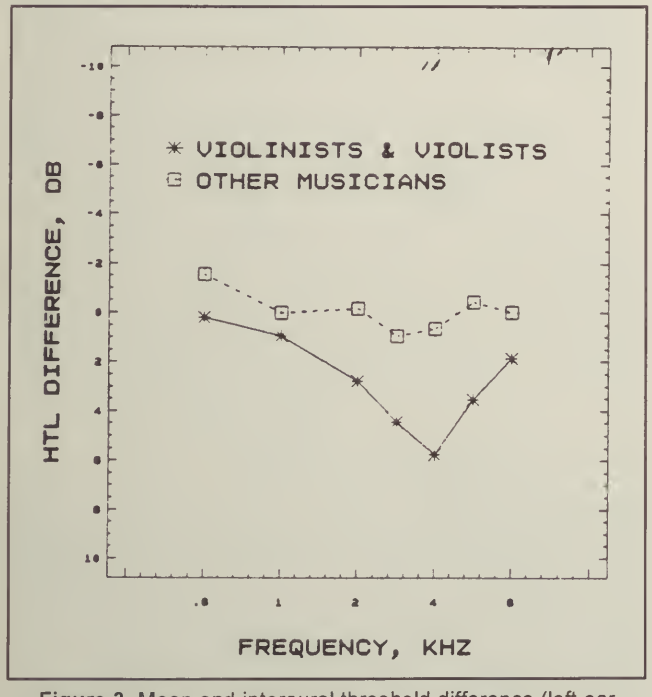

Figure 3. Mean and interaural threshold difference (left ear hearing threshold level [HTL] minus right ear HTL) for violinists and violists and for other musicians.

The noise exposures of a French horn player in an orchestra over a five-minute period are shown in **Figure 1**. Average noise levels are consistently >85 dB(A) with peak levels >125 dB(A). It should be noted that these levels were recorded in an orchestra pit, where the enclosed space would tend to enhance the intensity of the noise.

Few of the studies done to date have taken into account the contribution of noise exposure outside the orchestral context, that is, when practicing or otherwise playing alone. It is clear that this is also potentially damaging. **Table 1** shows the sound levels of various instruments, virtually all of which are capable of producing potentially dangerous levels of noise on their own. A noise histogram recorded from the right (more exposed) shoulder of a flutist playing a relatively quiet solo etude is shown in **Figure 2**. Again, recorded intensities are consistently at or above 85 dB(A).

OSHA considers an 85 dB(A) noise exposure averaged over an eight-hour day to be a 50% dose. The noise dose doubles for each additional 5-dB increase in noise (i.e., 90 dB=100% dose, 95 dB=200% dose, etc.). With each dose doubling, the allowable exposure to noise is halved (i.e., 90 dB=8-hour allowable exposure, 95 dB=4 hours, etc.).

Professional musicians are not the only persons at risk. In a study of noise levels in several high school bands and university bands and ensembles, Early and Horstman concluded that OSHA allowable limits were exceeded in their study samples even though the ensembles they evaluated rehearsed for only one to three hours a day.[9] In this study, noise doses as high as 567% for a four-hour rehearsal were documented for a snare drum player in a percussion ensemble. Doses in this and other ensembles were consistently greater than 50%, the level at which OSHA mandates initiation of a hearing conservation program.

Hearing loss in orchestral musicians

Now the question becomes, given that a clear noise hazard exists within symphony orchestras and other en-

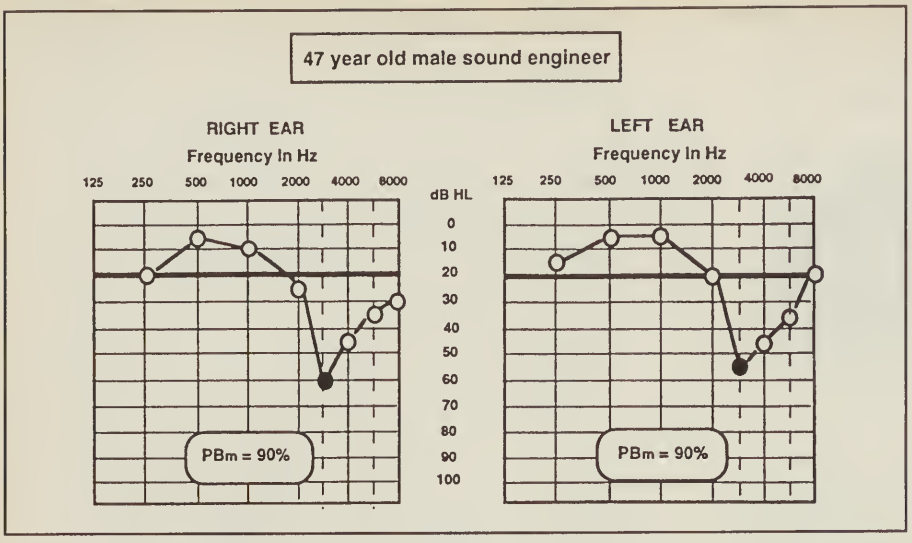

Figure 4. Audiogram for a 47-year-old songwriter and musician presenting to the audiology clinic with complaints of hearing difficulties and tinnitus.

Reprinted with permission from Hall JW, Santucci M. Protecting the professional ear: conversation strategies and devices. *The Hearing Journal* 1995;48:37-45.

sembles, can changes in hearing associated with such noise exposure be documented? Many studies clearly show just that.

In an examination of hearing thresholds from 60 orchestral musicians, Johnson et al. identified a so-called *noise notch* in the average thresholds of each of the age groups they evaluated.[10] Ostri et al., in a study of 100 Danish professional orchestral musicians, found a notched configuration in the audiograms of 50% of the male musicians they studied.[11] In their study of the Chicago Symphony Orchestra, Royster et al. documented a total of 52% of the ears showing signs of noise-induced permanent threshold shift. In terms of individual musicians, 71% showed audiometric patterns consistent with NIHL in one or both ears.[6]

Some ear-specific effects have also been found. Several studies have shown that, for violinists and violists, greater hearing loss exists for the left ear.[6,11] It is thought that this is because the left ear is more exposed to the sounding board, whereas the right ear is protected by head shadow effect and greater distance. This effect is shown in **Figure 3**.

Functional effects of high-frequency hearing loss for musicians

Although the amount of decrement in hearing identified in most of the above studies is admittedly small, because of the enhanced listening needs of this population, any amount of hearing loss is undesirable. As has already been discussed, an NIHL will typically produce most of its damage in the 3K to 6K Hz range. So, depending upon its severity, NIHL can make it difficult or impossible to hear some musical tones. A high-frequency hearing loss can make the highest notes of the piano keyboard (3,000 to 3,500 Hz) very soft or even inaudible, depending upon the severity of the hearing loss. Likewise, very high pitched violin or viola harmonics may not be perceptible. Inability to hear these sounds well (or at all) could clearly affect perception of timbre and balance.

It is in the perception of timbre or the spectrum of sound that NIHL has its most subtle effects. All sounds in nature consist of many individual tones (overtones) occurring at the same time. It is these overtones, and the way in which they cluster into areas of strong harmonics (called formants), that defines the quality or timbre of an instrument. These characteristic formants are what make a cello sound different from a bassoon or a bass clarinet. Even though these are bass instruments, they sound different because of their formant structure. These formants are, of course, very high frequency sounds.

The perception of formants in the professional singing voice is an instructive illustration of the importance of spectrum or timbre. For normal speech, vowel sounds are determined by the relative relationship of two strong formants. The relationship of these formants to each other defines the spoken vowel. In other words, it is the relationship of these formants that differentiates "ee" from "ah" from "oo." In the trained singer's voice, however, a third formant exists that has come to be called the *singer's formant*.[12] This cluster of overtones, typically falling in the 2,800 to 3,500 Hz range, is what gives the professional singing voice its *ring*, *brightness*, or *brilliance*. A high-frequency hearing loss that would make the singer's formant inaudible could interfere with the perception of good voice quality. This effect may be simulated by listening to a recording of an operatic singer with the equalizer of a stereo system set with the high frequencies (above 2K Hz) turned all the way down. This will simulate a mild high-frequency hearing loss. An-

other effect of NIHL for musicians is in the perception of balance between instruments. The audiogram of a songwriter and musician with an NIHL is shown in **Figure 4**. Besides tinnitus, the patient had complained of difficulties mixing recorded music in the studio.[13] In this case, to compensate for his high-frequency hearing loss, highs had to be exaggerated, distorting the balance he was trying to accomplish.

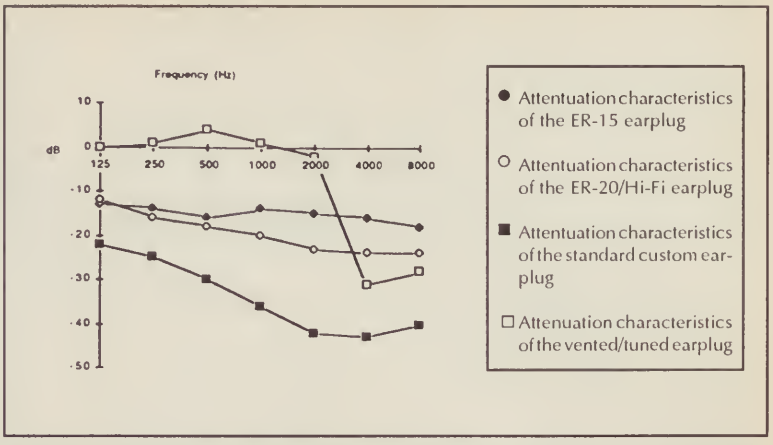

Figure 5. The real ear attenuation characteristics of three types of musician's earplugs and that of a standard earplug for reference.

Hearing protection and management of the professional ear

Protecting the professional ear is a problematic endeavor. For the most part, reducing the intensity of the noise at its source is not a practical solution. Athough Plexiglas barriers are used in many orchestras to protect those sitting directly in front of the brass and percussion, the effectiveness of these baffles is questionable. Balancing soft and loud music within a concert program may also be considered; however, artistic considerations may make this aesthetically inadvisable.

Reducing noise exposure at the level of the ear is perhaps the most practical solution. However, this presents its own set of difficulties. Until fairly recently, the only hearing protectors widely available were designed for industrial use. These devices typically provide more attenuation for the high frequencies than for the low frequencies, distorting the perceived spectrum or timbre of the sound. They also have a tendency to produce an occlusion effect, an enhancement of low frequencies that occurs when the ear canals are occluded. For singers and for instrumentalists whose instrument is in contact with the head or face, particularly brass and woodwinds, this can be a significant problem.

Several alternatives to the industrial hearing protection are now available. Etymotic Research has developed a line of custom (ER-15 and ER-25) and noncustom (ER-20/HiFi) hearing devices with a flat attenuation across the frequency range. These custom hearing protectors can be made with a deep insertion to reduce the occlusion effect.

Another option for avoiding occlusion effect is vented hearing protectors, a custom earplug with a vent drilled through the center. This hearing protector is acoustically transparent up to about 2 KHz with up to 30 dB of high frequency attenuation.[8] **Figure 5** shows the attenuation characteristics of these three types of hearing protectors, compared with a standard custom earplug designed for industrial use.

Protecting the professional ear is a challenging undertaking. Musicians may be exposed to high-intensity sounds in a variety of settings and venues. Intensities of exposure can differ dramatically, sometimes requiring no attenuation, and moments later becoming excessively loud. Different instruments have different requirements as to most appropriate hearing protection. Perhaps most problematic is the perceived stigma of hearing loss for a musician. In managing the professional ear all of these things must be taken into account.

The following are informal guidelines to help to determine whether a musician may be exposed to excessive noise.

- Do you need to shout to be heard by others during studio work or performances?
- Have you ever noticed a ringing noise in your ears for hours or even a day after noise exposure?
- Does music sound slightly distorted toward the end of a busy day?
- Do voices sound muffled after you have been around music for an extended time?
- Do your ears feel full or stopped up after noise exposure?

If the answer to any of these questions is yes, the person may be at risk for NIHL. The first step is to determine auditory system status with a thorough audiologic evaluation by a licensed audiologist. Audiologic testing should be repeated annually so that auditory status can be monitored and any changes in hearing can be addressed in a

timely manner. If possible, the evaluation should include otoacoustic emissions (OAE) testing. This is a relatively new addition to the audiologic test battery that evaluates cochlear (specifically outer hair cell) function much more directly than has ever been possible before. There is evidence that OAEs can reveal damage to outer hair cells before any hearing loss is noticed, indeed, before it may be present on an audiogram.[13]

The following suggestions will also help prevent or minimize damage to hearing.

- Avoid exposure to noise exceeding 85 dB whenever possible
- Whenever possible, reduce noise at the source or increase distance from a noise source
- When the above is impossible or impractical, wear appropriate hearing protection.
- Allow ears to rest for 24 to 48 hours after exposure to high levels of noise

Summary

Noise levels in the symphony orchestra are intense enough to cause permanent NIHL. NIHL is characterized by a primarily high frequency sensorineural hearing loss with a distinctively notched audiometric configuration. Audiometric configurations that are consistent with NIHL have been documented in symphony orchestra musicians. An NIHL is likely to interfere with the perception of timbre or sound quality. Although protection and management of the professional ear presents significant challenges, recent advances in hearing protection technology have solved some of the more onerous problems.

References

1. Rice C, Rossi, G, Olina M. Damage risk from personal cassette players. *Br J Audiol* 1987;21279–21288.
2. Axelsson A, Lindgren F. Hearing in pop musicians. *Acta Otolaryngol* 1978;85:225–231.
3. Jergen J, Jergen S. Temporary threshold shift in rock-and-roll musicians. *J Speech Hear Res* 1970; 13:221–224.
4. Drake-Lee AB. Beyond music: auditory temporary threshold shift in rock musicians after a heavy metal concert. *J R Soc Med* 1992;85:617–619.
5. Jansson E, Karlsson K. Sound levels recorded within the symphony orchestra and risk criteria for hearing loss. *Scand Audiol* 1983;12:215–221.
6. Royster, JD, Royster LH, Killion MC. Sound exposures and hearing thresholds of symphony orchestra musicians. *J Acoust Soc Am* 1991;89:2793–2803.
7. Sataloff RT. Hearing loss in musicians. *Am J Otol* 1991; 12:122–127.
8. Chasin M. Chang J. In situ ear protection program for musicians. *Hearing Instruments* 1991;42:26–28.
9. Early KL, Horstman SW. Noise exposure to musicians during practice. *Appl Occup Environ Hyg* 1996;11: 1149–1153.
10. Johnson DW, Sherman RE, Aldridge J, Lorraine A. Effects of instrument type and orchestral position on hearing sensitivity for 0.25 to 20 kHz in the orchestral musician. *Scand Audiol* 1985;14:215–221.
11. Ostri B, Eller N, Dahlin E., Skylv G. Hearing impairment in orchestral musicians. *Scand Audiol* 1989;18:243–249.
12. Sundberg J. Articulatory interpretation of the 'singing formant.' *J Acoust Soc Am* 1974;55:838–844.
13. Hall JW, Santucci M. Protecting the professional ear: conservation strategies and devices. *The Hearing Journal* 1995;48:37–45.
14. Folprechtova A, Miksovska O. The acoustic conditions in a symphony orchestra. *Pracov Lek* 1978;28:1–2.
15. Sabesky I J, Korocynski RE. Noise exposure of symphony orchestra musicians. *Appl Occup Environ Hyg* 10:131–135.

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What to call for

The 1997 edition of the National Institute of Aging's *Progress Report on Alzheimer's Disease* is available. Single copies are available for free and it is also available on the Alzheimer's Disease Education and Referral (ADEAR) Center's web site: http://www.alzheimers.org/adear.

For a free printed copy call the ADEAR Center toll-free at 800-438-4380 and ask for publication number 2138.

Shoulder problems in musicians

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Upper extremity problems in musicians are well documented and are seen in musicians regardless of expertise level.[1-5] Overuse syndromes occur primarily in the upper extremity; in orchestras the incidence of overuse syndromes ranged from 59% to 64% of all the musicians. In a study of 660 musicians at The Eastman School of Music, the musculoskeletal problems affected 67% and the upper extremity was affected 94% of the time. The most commonly injured area was the fingers (50%), followed by the hand, shoulder, and forearm.[6] In his study of 1,000 instrumentalists, Dawson found that overuse injuries occurred primarily in professional and collegiate musicians, and that the elbow and shoulder was involved in 11%. The second most common cause of injury in his cohort was trauma, with sports injuries prevalent in younger musicians while falls and household accidents were more frequent in older musicians.[2] A survey of 2,212 musicians by the International Conference of Symphony and Opera Musicians Committee on Music Medicine found that the shoulder, neck, and back were the musculoskeletal sites where more severe symptoms affected their play. Of all musculoskeletal complaints in this cohort, severe left shoulder pain comprised 11% of the total, and severe right shoulder pain comprised 13% of the total. Shoulder problems have been documented in other studies in instrumentalists.[7,8]

Involvement of the shoulder in the musician is not surprising because the shoulder complex functions to position the hand in space. The shoulder must also form a stable platform for the upper extremity to maintain these positions. Musicians presenting with upper extremity problems often have involvement of the shoulder. These shoulder problems are varied and can present the treating physician with challenges similar to those seen with competitive athletes who are highly motivated to return to their vocation or avocation. In this article cases that demonstrate the variety of shoulder problems that can occur in musicians

are presented. These cases will serve as a basis for discussing principles of treatment of shoulder problems in musicians.

Case 1

A 45-year-old right-hand–dominant composer presented with a two-week history of insidious onset of left shoulder pain. There was no history of trauma and the pain radiated into the deltoid region. He had no neck pain or paresthesias. He was otherwise in good health with no history of systemic diseases including gout, rheumatoid arthritis, ankylosing spondylitis, psoriasis, or diabetes. Despite taking an anti-inflammatory medication the pain was waking him at night. He had to decrease his nonsteroidal dosage due to mild gastrointestinal distress, but he had no signs of overt peptic ulcer disease. Upon examination he had no atrophy and a normal neurologic examination. He had full, symmetrical range of motion with no weakness in abduction or external rotation. He did have pain with passive forward elevation (Neer impingement sign) and tenderness over his biceps tendon superiorly near the shoulder. His radiographs were normal. His diagnosis was rotator cuff tendinitis and he was treated with a subacromial injection of corticosteroids and local anesthetic. He was also told to ice his shoulder daily and to perform range-of-motion stretching to prevent a frozen shoulder. Evaluation of his workplace revealed that the consoles used for mixing music tracks were positioned at an elevated level which exacerbated and perhaps initiated his problem. This was adjusted and the patient recovered with no limitations.

Case 2

A 44-year-old music teacher tripped over a rug while visiting a relative, landing directly upon her right, dominant shoulder. She had no previous problems with her shoulder, but immediately after falling found that she could not lift her arm. She went to an emergency room where plain radiographs revealed no fracture. The arm was placed in a sling and she was told to see an orthopaedic surgeon. Upon evaluation one week later the patient complained of pain with any attempt at elevation of the shoulder. Upon examination she was neurologically intact but could not elevate her arm past 40°. Her passive elevation was to only 60° and she had painful weakness with external rotation. She could not internally rotate past her belt level, but internal rotation strength with her arm at her side was normal. She was begun on passive range-of- motion exercises and daily ice packs, and was given an anti-inflammatory medication to increase her range of motion. A magnetic resonance image revealed a complete tear of her supraspinatus and her subscapularis tendons. Her biceps tendon was dislocated from the bicipital groove. Surgery was recommended once she had passive elevation above 90°. At surgery the above findings were repaired through an arthrotomy. The day after surgery passive pendulum exercises were begun along with active motion of her fingers, wrist, and elbow. Formal physical therapy began one week after surgery. The patient was allowed to use the arm below shoulder level as pain allowed and she was able to play the clarinet eight weeks after surgery. She eventually recovered and resumed her career with no limitations.

Case 3

A 19-year-old performing arts major at college who played violin was preparing for auditions when she developed insidious onset of pain in both shoulders. The pain initially began in her right, dominant shoulder, but later affected her left shoulder as well. She had no history of trauma, neck pain, weakness, or paresthesias. She tried low doses of ibuprofen (200 mg) intermittently with no relief. Chiropractic adjustments helped her sensation of neck tightness but did not help her shoulder pain. Upon examination the patient had no atrophy. There was a full range of motion of the shoulders, and neurologic examination was normal. She was tender over the anterior and lateral acromion, and she had positive impingement signs. She had hyperlaxity of her shoulders but no signs of instability. Plain radiographs of her shoulders and cervical spine were normal. Her history and examination suggested that she had rotator cuff tendinitis associated with her increased playing time. She was treated with increased doses of ibuprofen (800 mg four times a day) and told to ice the shoulders daily for 20 minutes and after playing. She was encouraged to take more frequent breaks. She was referred to a physical therapist for range-of-motion exercises to prevent a frozen shoulder. She also was instructed in rotator cuff strengthening exercises, which she was advised to do at least three times a week. The physical therapist videotaped the patient performing and initiated several changes in arm position while bowing. She subsequently changed majors to music education and changed undergraduate institutions. A new music instructor helped her further with positioning while playing and she was able to continue to play with only intermittent problems. She did not require medication and did not have problems with activities of daily living.

Discussion

These three cases demonstrate the wide variety and complexity of problems that can affect musicians. Like athletes, musicians can acquire musculoskeletal problems associated with their occupations or due to outside causes, such as a fall or automobile accident. In the cases presented here, the musicians had conditions that were not particular to their occupations alone, but the ergometrics of their musical careers did influence their treatment and rehabilitation.

Important variables in the evaluation and treatment of musicians include the level of participation, the age of the musician, and the instrument played by the musician. The classification of musicians by expertise advocated by Dawson is the most useful (**Table 1**).[3] In his study, 32% of the injuries were in class F athletes followed by class A (21%), class D (19.6%), and class E (16.6%). The grade of impairment is an important variable, and most epidemiological studies struggle with a definition that will reflect the severity of the problem. In the athletic literature an injury is defined as a problem that causes a lost day of participation or significant alteration of practice. Most epidemiological studies of musicians are questionnaires which merely ask if the musicians had a problem and whether it affected their play at any time. One study did grade the pain level from 1 to 5 (**Table 2**). Ninety-seven percent of those studied reported having symptoms for more than six months, and 35% reported having problems over five years. Fry concluded that most orchestra musicians had chronic pain from overuse and that most learned to live with it.[4] Age is a consideration because most traumatic injuries occur in the adolescent age groups, whereas overuse injuries tend to occur in the older populations.[2] However, secondary school music students may have pain severe enough to affect their function like adults.[9-12]

Assessment of overuse injuries in musicians should include a thorough history and physical examination like any other patient presenting with chronic pain. Radiographs and other studies should be utilized as indicated. Treatment of tendinitis, whether in the shoulder or elsewhere, should consist of ice application daily and, after playing, aspirin or nonsteroidal anti-inflammatory agents and judicious use of injections. Splinting is not usually indicated and some authors suggest it is contraindicated in musicians because it may promote fibrosis and loss of motion.[5] Range-of-motion exercises and stretching are recommended to allow continued function. This is especially true for the shoulder, where range-of-motion exercises are essential to prevent a frozen shoulder.

Rest and modification of the activity are essential for patients who do not respond to these measures. As in athletes, rest may mean decreasing the amount of playing or practicing as much as can be tolerated depending upon the level of participation and proximity to performances or competitions.[13] Fry has suggested that rest be considered to be either *modified rest*, in which the musician can continue to play with a reduction in time and intensity of playing, or *radical rest*, in which the patient does nothing to aggravate the condition including playing or particularly troublesome activities of daily living.[14] Severe cases may take 6 to 12 months to become pain-free in the radical rest program. In his series of 176 musicians treated with modified or radical rest, of those who remained in the program, 87% were healed with only one major recurrence of pain. Of the initial 176, 41 patients either quit the program early, gave up the instrument, transferred to another instrument, or did not start the treatment.[14]

Table 1. Musician classification

A	Professional	mostly performance
B	Professional	mostly teaching
C	Conservatory	collegiate music major
D	Skilled	active amateur
E	School musician	grades 2-12
F	Amateur	recreational instrumentalist

The type of instrument played also influences the type and location of musculoskeletal problems experienced by musicians.[1, 9, 10] Violinists and cellists can develop overuse syndromes in both shoulders, whereas flutists tend to get it primarily in the right shoulder. The incidence of left shoulder problems is higher in viola players: the ratio to right shoulder problems is 3:1.[15] Larger instruments were believed to be a factor because they require more abduction and external rotation. Bass players tend to have more right than left shoulder problems.[8, 15]

Ergometric assessment of the positioning used by the musician may be beneficial, as demonstrated by the first and third cases. Adjustment of the seat, stand, or body position may decrease stress or eliminate the cause of the stress. In cellists, electromyographic studies have shown that the periscapular muscles in the left shoulder contracted in relationship to the string contact on the fingerboard. Depending upon the maneuver being tested, the trapezius, deltoid, and serratus anterior muscles contracted to stabilize the shoulder complex.[16] The authors concluded that the shoulder muscle activity reflected a biomechanical need to maintain a fixed posture while playing. Another study using motion analysis equipment with high-speed cameras found that the right shoulder undergoes a large vertical displacement at the end

Table 2.

Level	Definition	Percent
1	Pain with playing	34%
2	Pain in multiple sites with transient weakness	38%
3	Pain in multiple sites with weakness and loss of muscle control	21%
4	Level 3 only affecting activities of daily living	5%
5	Incapacitating pain	3%

of the down bow, and the acromial displacement correlated with how much flexion was utilized at the elbow.[17] These studies emphasized how complicated the motions of the extremities are biomechanically.[18] Modification of a musician's technique or posture remains empirical and should be undertaken only if the physician has special knowledge of the demands of a particular instrument.

Rehabilitation has a role in those musicians who have had surgery or who have continued symptoms despite treatment with ice, relative rest, and medication.[13] Early mobilization is especially important after shoulder surgery to prevent a stiff shoulder, elbow, or hand. Early strengthening of segments distal to the shoulder using isometrics and grip strengthening help prevent atrophy of the forearm or hand muscles. Return to playing the instrument should be done with caution to prevent tendinitis due to deconditioning. Fortunately, surgery in musicians is not frequently necessary. In his review of 1,000 musicians seen in his practice, Dawson reported surgery was performed on 221.[2] The indications for surgery were overuse in 10%, trauma in 21%, arthritis in 18%, and other unspecified indications in 45%.[2] Musculoskeletal problems in musicians are common and protean, regardless of level of participation. It has become increasingly appreciated that the medical needs of participants differ from group to group, whether it is a marching band, an orchestra, or a teaching professional.[2, 10, 11] Most of these injuries, especially around the shoulder, can be managed with careful evaluation and treatment. The initial evaluation of these problems should include a careful history and physical examination. Particular attention should be paid to the neurologic examination, because many musicians can have arm pain due to nerve entrapment syndromes. Radiographs are indicated for any traumatic injuries and when there is no response to nonoperative measures. Cervical spine radiographs may be indicated when the pain is bilateral or if there is a radicular component. Further studies such as electromyography or magnetic resonance imaging of the neck or shoulder are warranted if the symptoms are severe or if there is no response to treatment. The initial treatment for most overuse syndromes in the shoulder consists of some form of rest, nonsteroidal anti-inflammatory medication, liberal use of ice, stretching, and rotator cuff strengthening. Corticosteroid injections can provide relief but should be used carefully because they can produce soreness lasting several days after the injection.

Referral to a specialist depends on many factors, but it should be considered in refractory cases not responsive to the measures noted above. Consultation with a therapist or physician knowledgeable in the ergometric nuances of playing may be necessary in some cases. Modification of technique by the instructor or health care specialist may decrease the symptoms, but no study has evaluated the efficacy of ergometric assessment and treatment in a large cohort of symptomatic musicians. Surgery is rarely indicated but can be successful if utilized judiciously. Sensitivity to the level of performance, severity of symptoms, and motivation to perform help the treating physician when working with musicians with shoulder problems.

References

1. Caldron P, Calabrese L, Clough J, et al. A survey of musculoskeletal problems encountered in high level musicians. *Med Probl Perform Art* 1995;10:120–133.
2. Dawson WJ. Experience with hand and upper-extremity problems in 1,000 instrumentalists. *Med Probl Perfom Art* 1995;10:128–133.
3. Dawson WJ. Hand and upper extremity problems in musicians: epidemiology and diagnosis. *Med Probl Perform Art* 1988;3:19–22.
4. Fry HJH. Incidence of overuse syndrome in the symphony orchestra. *Med Probl Perform Art* 1986;1:51–55.
5. Hoppman RA, Petrone NA. Musculoskeletal problems in instrumental musicians. In Sataloff RT, Brandfonbrener AG, Lederman RJ, eds. *Textbook of Performing Arts*. New York: Raven Press, 1991:71–109.
6. Larsson L, Baum J, Mudholkar GS, et al. Nature and impact of musculoskeletal problems in a population of musicians. *Med Probl Perform Art* 1993;8:73–76.
7. Fishbein M, Middlestadt SE, Ottati V, et al. Medical problems among ICSOM musicians: overview of a national survey. *Med Probl Perform Art* 1988;3:1–8.
8. Middlestat SE, Fishbein M. The prevalence of severe musculoskeletal problems among male and female symphony orchestra string players. *Med Probl Perform Art* 1989;4:41–48.
9. Fry HJH, Ross P, Rutherford M. Music-related overuse in secondary schools. *Med Probl Perform Art* 1988;3:133–134.
10. Bischof RO. Drum and bugle corps: medical problems and issues. *Med Prob Perform Art* 1994;19:131–136.
11. Havlik R, Upton J. Hand and upper limb problems in the pediatrician musician. *Med Probl Perform Art* 1996;11:56–63.
12. Shoup D. Survey of performance-related problems among high school and junior high school musicians. *Med Prob Perform Art* 1995;10:100–105.
13. Lederman RJ. Treatment outcome in instrumentalists: a long term follow-up study. *Med Probl Perform Art* 1995;10:115–120.
14. Fry HJH. The treatment of overuse injury syndrome. *Md Med J* 1993;8:277–282.
15. Blum J, Ahlers J. Ergonomic considerations in violinist's left shoulder pain. *Med Probl Perform Art* 1994;9:25–29.
16. Naill R, Mcnitt-Gray J. Surface EMG as a method for observing the muscle activation patterns associated with strategies of string depression used by cellists. *Med Probl Perform Art* 1993;8:7–13.
17. Tulchinsky E, Riolo L. A biomechanical motion analysis of the violinist's bow arm. *Med Probl Perform Art* 1994;8: 119–124.
18. Theim B, Greene D, Prassas S, et al. Left arm muscle activation and movement patterns in cellists employing a playing technique using rhythmic cuing. *Med Probl Perform Art* 1994;8:89–96.

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Breathing difficulties in wind instrument players

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ABSTRACT: *Performance of a wind instrument requires appreciable lung volume and diaphragmatic mechanical force, skilled breath control, adequate patency and humidity of air passages, and precise coordination of the oropharyngeal cavity. Depending on the instrument class, variable rates of air flow, pressure, and duration are necessary to produce optimal tone quality. Wind players may be seriously impaired by respiratory diseases that, comparatively, might appear trivial to the nonperformer. The workplace environment should be assessed for occupational hazards when managing these patients, and smoking should be particularly discouraged. Controversy exists implicating wind instrument use in the exacerbation of respiratory disease, including bronchial, laryngeal, pharyngeal, and oral anatomic changes—a result of the constant barotrauma of performance. Asthma is the most common chronic pulmonary disorder among wind players, and therapeutic programs that include breath training and physical exercise improve symptoms, endurance, and general well-being.*

Over 14 million patients in the United States meet the diagnostic criteria for primary lung disease.[1] Approximately 1% to 2% of Americans consider themselves players of a wind instrument. Assuming an equal distribution of lung disease among the population, roughly 150,000 to 250,000 wind players may have diagnosable lung disease. Of course, these figures may substantially underestimate the actual number of affected performers because of the limitation in self-reports of whom is a wind player and just what constitutes lung disease. Indeed, wind players may be seriously

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impaired by respiratory diseases that, comparatively, might appear trivial to the nonperformer. Conversely, the constant barotrauma from air pressure generated in the production of musical sound might be expected to exacerbate—possibly even initiate—a variety of respiratory diseases.

Requirements for wind playing

For proper sound production to emanate from a particular wind instrument, the artist must (1) form a sealed embouchure, (2) generate an air column with precise control of flow, duration, and pressure, (3) maintain a comfortable and steady playing position, and (4) be psychologically prepared for performance.[2] The embouchure (from the French meaning "opening into") refers to the adjustment of the mouth and facial muscles and the positioning of the tongue and mandible so that the lips will vibrate when air is blown through (or across) the mouthpiece. Variable in size and appearance, mouthpiece types include cup-shaped (e.g., trumpet), open-holed (e.g., flute), single-reed (e.g., clarinet), or double-reed (e.g., oboe). Although certain basic rules exist for proper orientation, the embouchure can vary greatly among individual performers of the same instrument. The external pressure applied between the mouthpiece and dentition is significant enough (ranging from 29 to 50 Newtons)[3] to alter tooth position or cause frank dental injury, as discussed elsewhere.[4,5] The orbicularis oris muscle is especially critical to tone production, and is occasionally injured to the point of requiring surgical exploration or repair.[6]

The generation and propagation of an air column—from alveoli, through the tracheobronchial tree and larynx, and across the embouchure—are likely the most important physical (and physiologic) requisites for producing sound. The breathing technique employed corresponds to the *breath support* of a singer, but the player of a wind instrument displays a much higher degree of muscular tension in the lips and face.[7] Coordination of the breathing apparatus requires the formation of an effective air column, adequate diaphragmatic endurance, patent air passages for rapid airflow, and proper mucociliary function and humidification. Musculature of the diaphragm, neck, chest wall, and abdomen all contributes to the production of the air column. The specific air pattern that is developed will depend on the physical requirements of the chosen class of wind instruments. For example, a high rate of airflow at low mouth pressure is necessary for the larger brasses or reeds (e.g., bass tuba requires an airflow of 1.68 l/sec. at an intraoral pressure of approximately 78 mmHg), whereas lower rates of airflow at much higher mouth pressure are adequate for smaller wind instruments (e.g., D-trumpet 0.40 l/sec. at 132 mmHg).[8] Because airflow multiplied by breath duration equals volume, and generated pressure multiplied by volume equals work, diaphragmatic endurance is positively correlated with the product of airflow multiplied by the generated pressure multiplied by breath duration. An increase in any of these attributes (e.g., holding a note longer, playing higher notes) will mandate an increase in the mechanical work performed by the diaphragm.

A steady, but comfortable, playing position requires strong, but relaxed, muscles of the neck, shoulders, chest and arms. Awkward positioning may impair full diaphragmatic excursion, unnecessarily exhaust available playing energy, and impair good acoustical sound projection to the audience. Holding an instrument weighing several pounds at a specific tangent to the lips for a prolonged period of time is an achievement. Routine physical exercise (e.g., stretching, weight training, swimming) is not only desirable, but likely a necessity for the serious performer. A properly adjusted seat and music stand height are also quite important in optimizing the playing position.

Psychological preparedness cannot be underestimated: stage fright dramatically affects many parts of the respiratory system with a dry mouth, trembling muscles, tachypnea, and generalized sympathetic excitation. Although repeated performances are the best "cure" for channeling disabling anxiety into a more "keyed-up" positive attitude, occasional use of beta-blockers (e.g., propranolol 10–20 mg orally one-half to one hour before concert time) can substantially reduce unwanted sympathetic symptoms.[2] Caution should be exercised when using these agents in players with bronchospastic disease.

Breathing difficulties in wind players

Not all disorders of breathing are necessarily medical in origin. The novice wind player may simply exhibit inefficient breathing or early tiring from a lack of endurance. Breath imprecision, or the inability to produce an exact flow-volume-duration pattern for the desired tonal quality, improves with experience and training. Poor airflow directivity, where the air column generated does not properly cross the embouchure, can result in inefficient playing or playing of variable intensity. Most nonmedical disorders can be improved with breath-training exercises, preferably under the supervision of a knowledgeable musical therapist. Impairments in the formation of the embouchure due to dental malalignment can often

be improved with appliances, such as molded guards or bite blocks, or orthodontia.[3]

A variety of acute and chronic medical disorders can plague the wind musician. Ubiquitous respiratory infections, whether bacterial or viral, that might appear trivial to a nonperformer can rapidly reduce endurance, increase salivation or mucus production, and interrupt air column formation (i.e., from coughing or sneezing). Respiratory tract inflammation may result from typical seasonal allergens or, rarely, from environmental exposure to fragments of the musical instrument itself.[9] Periodic and thorough instrument cleaning and the avoidance of inferior quality metals or reeds may reduce the incidence of these occupational exposures. Antisialagogues (e.g., transdermal scopolamine[10]) may be helpful for reducing excessive secretions and humidity within the instrument. Chronic respiratory diseases, such as asthma or emphysema, should be approached as for nonperformers. However, musical performance should be equated with sporting or other physical activity: optimize therapy preceding anticipated performances (such as bronchodilators and inhaled anti-inflammatory agents), and avoid playing when acute exacerbations are present. Abstinence from documented toxins (e.g., smoking) should seem self-evident to those performers who rely on air production for their (a)vocation, but the incidence of smoking may actually be higher in wind musicians than in nonperformers.[11] Physicians should also assess the workplace environment—be it an open stage, an orchestra pit, an outdoor pavilion, or a night club—when managing respiratory ailments in musicians. Some performance or practice locations can present adverse working conditions, depending on humidity, temperature, ventilation, and ambient allergens or pollutants.

Extrapulmonary losses of air usually referred to as a *loss of seal,* are occasionally seen in wind players.[12] Palatoparesis, an inability to completely close the soft palate and velopharyngeal port, allows air loss into the nose and prevents the musician from sustaining adequate intraoral pressure. Its etiology is unclear, but it is probably acquired from the constant strain and fatigue of the muscles or nerves of the palate. Palatal exercise and rest from playing may be all that is necessary to reduce symptoms, particularly with amateur performers.[13] Obturators or palatal lift-type prostheses may be required to reduce air loss. Patulous eustachian tube is an abnormal and constantly open eustachian orifice, probably related to dysfunction of the tensor veli palatini muscle from constant barotrauma. The resultant abnormal pressurization of the middle ear causes autophony (i.e., the sensation of speaking in an echo chamber) and limits the musician's ability to properly listen to other performers. Careful otologic examination or tympanometry[14] may reveal a respiratory variation in the position of the tympanic membrane. Treatment options include topical application of anticholinergic or mucus-producing drugs, or surgical management.[15,16]

As an example of the substantial increase in intrathoracic pressure generated during playing, a sufficient rise in systemic pressure can occur to the point of vascular rupture: spontaneous cervicothoracic epidural hematoma with severe neurologic injury has been reported following prolonged Valsalva from trumpet playing.[17]

Does wind playing cause respiratory disease?

The constant and relatively high airway pressures generated during sound production could be expected to cause barotrauma anywhere throughout the respiratory system. An obvious example is insufflation of the salivary apparatus known as "wind parotitis" (pneumoparotiditis), owing to the propensity of the parotid gland to collect air.[18] This rapidly-developing swelling (which can mimic the mumps)[19] can be palpated under the parotid fascia, and slowly recedes over several days with playing abstinence. Despite the common occurrence of salivary gland swelling, sialographic evidence of ductal dilatation has not been found long-term.[20] Rarely, air can dissect extraorally into the surrounding soft tissues of the head, neck, and even thorax, resulting in subcutaneous or interstitial emphysema.[12] Outpouchings of the large air passages in the larynx and pharynx can occasionally result from sustained pressure. Laryngoceles emanating from the saccule of the laryngeal ventricle, between the true and false cords, usually presents with hoarseness, coughing, dyspnea and/or localized swelling in the neck. Direct compression on the vocal cords or its associated nerves can occur, causing dysfunction in phonation. Presumably, the etiology of laryngocele formation requires barotrauma in the setting of an open glottis, because similar activities that generate high airway pressure (e.g., coughing, straining) do not predispose the patient to these types of hernias. Surgical resection via an external approach is advocated for disabling symptoms or airway compromise, but asymptomatic laryngoceles may not require removal.[21] A similar expansion of the lower pharynx, or a pharyngocele, appears to have a predilection for wind players.[12] Here an outpouching of the common air/food channel can retain

liquid or particulate matter. Neck collars or physical therapy to strengthen the neck musculature may provide some palliation of symptoms,[22] but surgical resection may be necessary for complaints of recurrent regurgitation or dysphagia.

In contrast to the macroscopic changes seen in the proximal air passages from chronic barotrauma, the effects on the distal respiratory tree are less well described, more difficult to investigate, and generally occult to the musician. For example, bronchial cell atypia and metaplasia—in addition to metallic foreign body inclusions—have been found in sputum samples from wind instrumentalists, but whether these changes presage clinical lung disease has not been demonstrated.[9] The question remains: "does wind playing lead to emphysema?" Although some studies have found better[23,24] or similar[25,26] pulmonary function compared with controls, few studies[27] have demonstrated changes consistent with emphysema in wind players (i.e., increased total lung capacity, increased residual volume, increased residual volume-to-total lung capacity ratio). Most studies of lung function in musicians have failed to conclusively answer this question, primarily due to faulty study design, small numbers of subjects, lack of control for confounding factors (e.g., smoking, age, performance experience), definition of a performer, etc. In one well-controlled and designed study comparing singers, wind and other (string or percussionist) instrumentalists, no significant differences were found between the groups in common pulmonary indices, including forced expiratory volume in one second, forced vital capacity, maximum voluntary ventilation, peak inspiratory or expiratory pressures.[28] However, as expected, both advancing age and amount of smoking correlated negatively with most of the measured pulmonary function tests. Indirectly, this study would seem to indicate that ventilatory training associated with many hours of practice does not result in appreciable improvements in pulmonary function in otherwise healthy wind players.[29] Unfortunately, no study has specifically tracked the long-term changes in pulmonary function over the years of development from novice to expert performer. Perhaps it is not the magnitude of lung function that is important to successful wind players, but the inherent or acquired differences in respiratory perception and ventilatory neuromuscular control that afford masterful playing.[30]

How does wind playing affect asthma?

The constant strain on the respiratory system by wind performance might be expected to aggravate asthma, a very common lung disease known to be both paroxysmal and triggered by stress or exertion.[31] However, structured conditioning of the respiratory muscles, through physical therapy and breathing exercises, may actually reduce exacerbations of asthma.[32] Remarkably, asthma-related skeletal deformities, such as pectus carinatum and excavatum, have reportedly disappeared in youths excelling at wind playing, over years of practice.[33] One of the commonly described breathing techniques, a *pursed-lip* forced expiratory exercise, bears remarkable resemblance to wind instrument playing.[34] Indeed, when the great American band leader Paul White was queried about asthmatic wind players he had directed over the years, he responded that they appeared to more quickly "... blow their asthma away..." than did their non-wind colleagues.[33] Subjective confirmation of this comes from responses to a questionnaire sent statewide to band instructors in Florida: most respondents believed that blowing a wind instrument strengthened the muscles of breathing, improved endurance, substantially reduced asthma symptoms, and eventually, alleviated parents' concerns about the child's ability to perform physically.[33] In a small study of teenage asthmatic musicians completing daily diaries, wind players appeared to better cope with their disease and exhibited better mental health skills than did non-wind colleagues.[35] Wind playing is obviously not solely a physical activity, but involves substantial psychological benefit and positive psychosocial interactions. Although music therapy itself can afford substantial relaxation, listening—but not performing music—is actually associated with decreases in pulmonary function and no substantial therapeutic effect on asthma, presumably from enhanced parasympathetic tone.[36] It appears, therefore, the combination of both producing and enjoying the performance of music is synergistic in minimizing pulmonary complaints.

The choice of medications for managing asthmatic symptoms may be influenced by the appearance of side effects that are particularly noticeable in the wind musician. Sympathomimetic bronchodilators can cause trembling, shaking, shuddering or untoward anxiety, impairing otherwise proper performance. In general, the beta-2 receptor-specific (e.g., albuterol) or anticholinergic (e.g., ipratropium bromide, atropine) metered-dose inhalers are much less likely than older generation bronchodilators (i.e., epinephrine) or oral medications to produce undesirable symptoms.[2]

Summary

The performer of a wind instrument repetitively exposes the full respiratory tree to barotrauma, which can result in detectable microcellular injury, allergen exposure, and, rarely, frank herniation of the large conducting passageways. None-

theless, the development of clinical lung disease, particularly emphysema, from long-term wind playing has not been scientifically demonstrated. Wind performance probably improves lung endurance, but is training- and experience-dependent. The benefits are particularly evident in players with asthma, for whom physical therapy, breathing exercises, and secondary psychosocial benefits can reduce respiratory symptoms and enhance physical and emotional well-being. Wind players rely critically on their ability to produce sound with precise manipulations of airflow, pressure, and duration. Expeditious management of acute or chronic diseases involving the breathing apparatus is of particular priority. It remains to be elucidated whether musicians who excel at wind playing have exceptional pulmonary function, demonstrate a physiologic advantage due to self-selection, acquire a physiologic advantage due to years of training and experience, or simply have a heightened awareness for health and well-being.

References

1. Higgins MW, Thom T. Incidence, prevalence, and mortality. In: Hensley MJ, Saunders NA, eds. *Clinical Epidemiology of Chronic Obstructive Pulmonary Disease*. New York: Marcel Dekker, Inc. 1990:23–43.
2. Farkas P. Medical problems of wind players, a musician's perspective. *Cleve Clin Q* 1986;53:33–37.
3. Borchers L, Gebert M, Jung T. Measurement of tooth displacements and mouthpiece forces during brass instrument playing. *Med Eng Phys* 1995;17:567–570.
4. DiStasio ER. Wind instruments, another look. *J Mass Dent Soc* 1981;30:152–155.
5. Florentine GA. Musical wind instrumentalists, facial pain and tooth movement. *J Conn State Dent Assoc* 1974;48:5–9.
6. Papsin BC, Maaske LA, McGrail JS. Orbicularis oris muscle injury in brass players. *Laryngoscope* 1996;106:757–760.
7. Ocker C, Pasher W, Röhrs M, Katny W. Voice disorders among players of wind instruments? *Folia Phoniatr* 1990; 42:24–30.
8. Cugell DW. Interaction of chest wall and abdominal muscles in wind instrument players. *Cleve Clin Q* 1986;53:15–20.
9. Plamenac P, Nikulin A. Atypia of the bronchial epithelium in wind instrument players. *Acta Cytol* 1969;13:274–278.
10. Dettman CE. Suppression of salivation in wind-instrument players with scopolamine. *N Engl J Med* 1984;310:1396.
11. Schorr-Lesnick B. Lung function and health attitudes and habits in professional wind musicians and vocalists. *Mount Sinai J Med* 1988;55:346–352.
12. Levine HL. Functional disorders of the upper airway associated with playing wind instruments. *Cleve Clin Q* 1986;53: 11–13.
13. Conley SF, Beecher RB, Marks S. Stress velopharyngeal incompetence in an adolescent trumpet player. *Ann Otol Rhinol Laryngol* 1995;104:715–717.
14. Henry DF, DiBartolomeo JR. Patulous eustachian tube identification using tympanometry. *J Am Acad Audiol* 1993; 4:53.57.
15. DiBartolomeo JR, Henry DF. A new medication to control patulous custachian tube disorders. *Am J Otol* 1992;13: 323–327.
16. Dyer RK Jr, McElveen JT Jr. The patulous eustachian tube, management options. *Otolaryngol Head Neck Surg* 1991; 105:832–835.
17. David S, Salluzzo RF, Bartfield JM, Dickinson ET. Spontaneous cervicothoracic epidural hematoma following prolonged valsalva secondary to trumpet playing. *Am J Emerg Med* 1997;15:73–75.
18. Rupp RN. Pneumoparotid, an interesting cause of acute parotid swelling. *Arch Otolaryngol* 1963;77:665–668.
19. Pritchett ELC. Wind parotitis (cont.). *N Engl J Med* 1973; 289:1094.
20. Kilpinen E. Width of the main duct of the parotid gland in wind instrument musicians. *Dentomaxillofac Radiol* 1978; 7:79–81.
21. Macfie DD. Asymptomatic laryngoceles in wind-instrument bandsmen. *Arch Otolaryngol* 1966;83:270–275.
22. Garvis WJ, Hoffman HT. Hypopharyngeal dilatation in a musician. *Ann Otol Rhinol Laryngol* 1996;105:669–670.
23. Bouhuys A. Lung volumes and breathing patterns in wind-instrument players. *J Appl Physiol* 1964;19:967–975.
24. Stauffer DW. Physical performance, selection and training of wind instrument players. *Ann N Y Acad Sci* 1968-9;155: 284–289.
25. Navrátil M, Rejsek K. Lung function in wind instrument players and glassblowers. *Ann N Y Acad Sci* 1968–9; 155:276–283.
26. Borgia JF, Horvath SM, Dunn FR, et al. Some physiological observations on French horn musicians. *J Occup Med* 1975;17:696–701.
27. Akgün N, Ozgönul H. Lung volumes in wind instrument (zurna) players. *Am Rev Respir Dis* 1967;96:946–951.
28. Schorr-Lesnick B, Teirstein AS, Brown LK, Miller A. Pulmonary function in singers and wind-instrument players. *Chest* 1985;88:201–205.
29. Clausen JL. Of wind and song. *Chest* 1985;88:165–166.
30. Smith J, Kreisman H, Colacone A, et al. Sensation of inspired volumes and pressures in professional wind instrument players. *J Appl Physiol* 1990;68:2380–2383.
31. Sataloff R, Spiegel J, Hawkshaw M. The effects of respiratory dysfunction on instrumentalists. *Med Probl Perform Art* 1990;5:94-97.
32. Wolf S. Rehabilitation of asthmatic patients, motivating your patients to improve their life-style. *Postgrad Med* 1991;90:93–96.
33. Marks MB. Musical wind instruments in rehabilitation of asthmatic children. *Ann Allergy* 1974;33:313–319.
34. Gröller B. On the effectiveness of combined relaxation exercises in children with bronchial asthma. *Rehabilitation* 1991;30:85–89.
35. Lucia R. Effects of playing a musical wind instrument in asthmatic teenagers. *J Asthma* 1994;31:375–385.
36. Lehrer PM, Hochron SM, Mayne T, et al. Relaxation and music therapies for asthma among patients prestabilized on asthma medication. *J Behav Med* 1994;17:1–24. ■

Performing arts medicine and the Internet

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ABSTRACT: *The tremendous growth of the Internet and the World Wide Web over the last ten years has revolutionized communication in the United States. A great deal of information is available to assist in patient education and medical decision making. The field of performing arts medicine represents only a small portion of the web, but the relevant sites provide much helpful material. Bibliographic sites lead the researcher to further print resources. Many of the organizations concerned with performing arts medicine have web sites describing their history, goals, and services. Sites maintained by individuals, universities, and associations cover the field in general, as well as specific topics such as repetitive strain injuries, related computer and typing injuries, carpal tunnel syndrome, and hearing loss. Performing arts medicine is a highly interdisciplinary field and the collaborative nature of the Internet is well suited to this diverse, geographically dispersed population.*

There is no doubt the Internet has revolutionized communications in the United States like nothing before it. As a mechanism for information dissemination, it functions without regard to geographic location or time. Anyone with access to a computer, the appropriate software, some knowledge of how the technology works, and a little patience can find information, whether they are a professor at an esteemed university or a homeless person using the public library.

From its beginnings in the 1960s at the Defense Advanced Research Projects Agency, Internet computer technology has grown with the addition of many ideas from various government agencies, such as the

Department of Energy and NASA, universities, such as the Massachusetts Institute of Technology and the University of California at Berkeley, and commercial sources, such as Xerox and AT&T. Grants from the National Science Foundation accelerated the growth in the number of Internet connections and created a national backbone for network traffic. E-mail and downloading of files in the federal, academic, and industrial communities became almost commonplace by the 1980s.[1]

In 1991, the software products Gopher and World Wide Web were released. By 1992, over 1,000,000 host computers were attached to the Internet. In 1993, Mosaic, the first World Wide Web browser, became available. Web traffic showed an annual growth rate of 341,634%. By 1995, use of the web accounted for the greatest part of traffic on the National Science Foundation's network. In 1993, it was estimated there were 130 World Wide Web sites; by 1996, there were 230,000.[2]

This tremendous growth in the web was not lost on hospitals, medical schools, and commercial purveyors of medical information. The American Medical Association, the American Hospital Association, most medical schools, and many hospitals all over the country maintain web pages. Instant electronic communication allows both physicians and patients to access the latest advances in diagnosis and treatment for almost any disease or injury.[3]

While still a small part of the web, performing arts medicine has taken advantage of its capabilities. Several large sites, as well as a number of smaller, more specific web pages, have been developed over the last few years by health professionals and consumers. Unfortunately, most web search engines are not yet sensitive enough to distinguish them from the related topics of arts therapy, use of the arts in health care facilities, and art and literature concerned with medical topics. However, the larger sites do an admirable job of providing relevant links.

Bibliographic sites

For those researching performing arts medicine, there are three bibliographic sites that can lead to a wealth of information both specific to and related to the field.

Med Chi's Music Medicine Clearinghouse maintains the Occupational Diseases of Performing Artists Bibliography (http://www.sailor.lib.md.us/forms/music_bib.html). The file includes over 1,000 published items and is part of Sailor, Maryland's online public information network; it is linked to the Med Chi web site. The items listed include journal articles and books from the medical, musical, and popular literature, mostly from the last 150 years. Users may perform a keyword search or download the whole file. Med Chi provides quarterly updates for the bibliography. Although this bibliography is probably the most focused available, there are no abstracts or subject headings and only rudimentary searching and display capabilities.

CAIRSS (Computer-Assisted Information Retrieval Services System) (http://imr.utsa. edu/CAIRSS.html), based at the University of Texas San Antonio (UTSA), is a database of research literature in the fields of music therapy, music education, music psychology, and music medicine. More than 1,000 journals are represented with annotated, indexed citations. CAIRSS is part of UTSA's Institute for Music Research. The annotations and indexing are valuable assets; however, the searcher must separate the music medicine citations from those dealing with other aspects of music and medicine.

The Music and the Brain Information Database (MBI) (http://galaxy.einet.net/hytelnet/ FUL063.html) is headquartered at the Center for the Neurobiology of Learning and Memory at the University of California, Irvine. Funded by a start-up grant from the National Association of Music Merchants, MBI focuses on music as related to behavior. Topics include creativity, the neuropsychology of music, the physiologic effects of music, the auditory system, perception, etc. The database can be searched by keywords. Although not strictly concerned with performing arts medicine, MBI can provide related neurobiologic research.

Organization sites

A number of organizations concerned with performing arts medicine have their own web sites. These range from single pages listing an organization's description and contact information to pages with extensive graphics and games highlighting available services.

The Performing Arts Medicine Association (PAMA) is the primary American organization focused on performance-related problems. It was founded in 1989 for physicians. They now have an associate member category for allied health professionals, researchers, arts educators, and others with serious interest in the field. PAMA's purposes are to develop educational programs, promote communication among health professionals and arts educators, and foster research. Their new web site (http://www.artsmed.org) is under construction. It contains a short description of the organization, information on the Symposium on the Medical Problems of Musicians and Dancers, which they sponsor each year, and recent Tables of Content from their official journal, *Medical Problems of Performing Artists*. There is also an e-mail link to PAMA's Communication Committee chairperson. They are building a list of related links.

The International Arts Medicine Association (IAMA) is a broader organization, founded in 1985 to foster international interdisciplinary communication between arts and health professionals interested in any aspect of the relationship

between these two fields. Members include health professionals, educators, researchers, and artists in 20 different countries. IAMA's web site (http://members.aol.com/iamaorg/index.html) is divided into three sections: performing arts medicine, arts therapies, and arts in health care settings. In addition to related links, there is information on IAMA's goals, how to contact the organization, and a membership form.

The Canadian Network for Health in the Arts (CNHA) has a web site (http://web.idirect.com/~cnha) maintained by Christine Zaza, Ph.D., an epidemiologist with a number of publications on prevention of musculoskeletal disorders in musicians. CNHA was founded in 1995, mostly as an information source for Canadians involved with the health issues of performers. Their web site includes a running Canadian bibliography and a growing number of links.

The Center for Safety in the Arts (CSA) is mainly concerned with hazards of visual artists. However, they have short, informative fact sheets and other publications of interest to performing artists. Their web site (http://artswire.org:70/1/csa) explains the center's programs, lists their publications, and provides links to other health and safety sites. Unfortunately, CSA has lost most of its funding, so the site's contents have not been kept current. Their newsletter, *Arts Hazards News*, is still published and the most recent issue is included on the site. Considering the current difficulty in contacting CSA personally, their web site is often the best way to access several valuable fact sheets on the problems of musicians.

Médecine des Arts (http://www.arts-medicine.com/framesa.htm) is a site maintained by the association of the same name, based in Paris. This organization is concerned with the occupational problems of both visual and performing artists. The site gives information about the association, their journal, books related to arts medicine, courses the association offers in Europe, and a description of a proposed international diploma in arts medicine. Formal coursework in arts medicine has been discussed at various times in the United States, but nothing such as this European model has emerged. There is also a news section listing conferences, new publications (mostly in French), and other items of interest. The site is available in both English and French.

The British Performing Arts Medicine Trust (BPAMT) has just created a web site (http://www.cygnet.co.uk/BPAMT/about.html). BPAMT was founded in 1984 and includes the Association of Medical Advisors to British Orchestras. This unique group provides house doctors to nearly all of Britain's top orchestras on a volunteer basis. The trust has a clinic and hotline and is developing regular training sessions and a referral service. Their web site currently includes a history and description of the organization and its subgroups, along with lengthy information on the recent York Conference co-sponsored by BPAMT and the International Federation of Musicians Unions. Mostly because of the support and funding of this union, BPAMT has been able to develop stable, accessible programs, which have eluded American counterparts.

The Hannover University of Music and Theatre's Institute for Music Physiology and Performing Arts Medicine (http://193.175.158.129/pages/english1.html) also has begun developing a site. Their current web pages give the history of the institute, a list of sponsored lectures and research being conducted, information on the special clinic for performing artists, and a list of staff. The institute is developing an expanded site, available in both English and German. The staff and research lists are valuable to American researchers.

A different type of organization — HEAR, which stands for Hearing Education and Awareness for Rockers – was founded in California in 1988 to educate rock musicians and concert-goers about the dangers of loud music. They develop and distribute information on hearing loss and hearing protection, produce public service announcements, provide referrals, and distribute earplugs at rock concerts. A number of prominent rock stars have been spokespersons for their various hearing awareness campaigns.

Not surprisingly, HEAR's huge website, HEARnet (http://www.hearnet.com/ text/mainframe.html), is full of eye-catching graphics, games, and surveys. The info booth area consists of the history of the organization, an FAQ about hearing loss, a discussion of how hearing works and how to protect it, tinnitus information, what hearing loss really means in terms of quality of life, a large list of various kinds of earplugs, and a place to ask questions. The tour schedule section lists where HEAR volunteers will be giving out earplugs and information at concerts, as well as when HEAR promotions and news reports will be appearing on radio and television. The souvenir stand sells not only T-shirts and other items emblazoned with hearing awareness slogans, but also various types of earplugs and headphones and a CD-ROM hearing test kit. The whole web site is generously sprinkled with pictures and quotes from rock stars, including Lars Ulrich of *Metallica*, Pete Townsend of *The Who*, and even Ray Charles. The graphics and general presentation are geared toward the stereotypical rock concert-goer who is perceived to use the Internet mostly for entertainment. However, the information is serious and, in many cases, quite hard hitting. It could prove to be a good way to reach young adult musicians with information on hearing conservation.

Information sites

Performing Arts Medicine at Ithaca College (http://www.ithaca.edu/hshp/pt/pt1/index.html) is a site maintained by Nicholas Quarrier, a physical therapist. It includes a description of the Health and Performance Institute for

Musicians, held at Ithaca each year, and information about their Physical Therapy Clinic, where they treat a fair number of musicians. In a section called topics of interest, there are articles written by arts medicine practitioners and case studies from the clinic. Quarrier provides links to other web pages related to arts medicine. One of these is a new site for the American Physical Therapy Association's Performing Arts Special Interest Group. As might be expected, this site provides information relevant to physical therapy and associated medical specialties.

Musicians and Injuries (http://www.engr.unl.edu/ee/eeshop/music.html), hosted by the University of Nebraska at Lincoln, is perhaps the largest performing arts medicine site. This site was developed by a musician who had a repetitive strain injury (RSI), Paul Marxhausen. Marxhausen is an engineering electronics technician at UNL and an amateur guitarist. The web page started as personal research, which he then made available to others on the Internet. Many people have sent him resources to be added, resulting in a site over 20K in size.

The first section of Marxhausen's site lists general things injured musicians can do to help themselves, such a taking breaks, evaluating technique, and contacting a health professional. A long annotated list of books and tapes, often includes links to ordering, reviews, quotes, and publisher or author web sites. Marxhausen also has links to online articles, bibliographies, organizations, and newsgroup discussions divided by instrument. Another interesting section of his web site is FindaDoc – a list of physicians and other health care professionals recommended by people who have suffered from RSI.

Throughout his site, Marxhausen includes prominent disclaimers and reminds people to contact their physician at the first sign of trouble. There is a tremendous amount of information here, particularly on the initial page of the site. It can be somewhat daunting to navigate, but definitely worthwhile for the patient searcher.

Performing arts medicine-related sites

There are a number of sites on specific medical problems and ergonomics that can be useful to arts medicine researchers.

At the University of Nebraska at Lincoln, Paul Marxhausen also maintains a site called Computer Related Repetitive Strain Injury (http://www.engr.unl.edu/ee/eeshop/rsi.html). Many of the overuse injuries musicians develop are the same as those seen in computer users, because the constant finger, hand, and arm movements are often similar. Also, in an increasingly online world, many musicians use computers for other employment, further education, and recreation. Marxhausen links to explanations of the various problems included under the umbrella of RSI, provides graphics of proper typing technique and posture, and gives basic advice on how to prevent RSI. The site includes a bibliography and a list of links to other Internet sites. Particularly helpful are the links to ergonomics sites with detailed descriptions and pictures of workstation configuration and posture.

A good companion site is the Typing Injury FAQ (http://www.cs.princeton.edu/~dwallach/tifaq/), maintained by Dan Wallach at Princeton and Scott Wright at the University of California, San Jose. The general information section includes a glossary and definitions, general guidelines on posture and ergonomics, an FAQ about workstations and injuries they can cause, and annotated lists of publications, listservs, newsgroups, gopher archives, and other web resources. There are also sections on keyboards, mice, furniture, and software that offer short descriptions, pictures, contact information, and estimated prices.

Another useful resource is the Carpal Tunnel Syndrome site (http://www.netaxs.com/~iris/cts/). This site has links to various databases that describe the causes, symptoms, treatment, and prevention of carpal tunnel syndrome. There are also links to ergonomics sites with extensive information on workstation configuration, injuries caused by pointing devices, and other topics. The two University of Nebraska sites, the Typing Injury FAQ, and the Carpal Tunnel site listed above, link to each other and provide a wealth of information related to the repetitive movements used by musicians, especially those who also use computers.

These examples illustrate that, although one has to do a little searching, there is performing arts medicine information to be found on the World Wide Web. Like the Internet itself, performing arts medicine is a collaborative endeavor with many stakeholders in the broad disciplines of medicine and the arts. The Internet provides a means to facilitate communication and information exchange among this diverse, geographically dispersed group. "The Internet today is a widespread information infrastructure, the initial prototype of what is often called the National (or Global or Galactic) Information Infrastructure. . .its influence reaches not only to the technical fields of computer communications but throughout society as we move toward increasing use of online tools to accomplish electronic commerce, information acquisition, and community operations."[1]

All sites were verified in September 1997.

References

1. Leiner BM, Cerf VG, Clark DD, et al. A brief history of the Internet. [web page] Feb 1997; http://www.isoc.org/internet-history. [Accessed 9 May 1997].
2. Zakon RH. Hobbes' Internet timeline v2.5. [web page] Aug 1996; http://info.isoc.org/guest/zakon/Internet/History/HIT.html. [Accessed 9 May 1997].
3. Garten BJ. From the editor. *Info To Go* 1997;4(4):1. ■

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Preliminary Program information will be mailed shortly.

Information for AUTHORS

The Maryland Medical Journal (MMJ) *is a monthly publication of the Medical and Chirurgical Faculty of Maryland. The journal's goals are educational and informative: the publishing of scientific articles (original research, case studies, and review articles) and other technical information, as well as editorials, letters, special articles (evaluations, position papers, reviews of nonscientific subjects), membership and legislative news, continuing medical education notices, and programs and policies of the faculty.*

- ***Letter of transmittal***—The letter of transmittal, which all authors must sign, should include the full names, degrees, titles, and affiliations of all authors, and the name, address, and phone number of the author to whom reprint requests and correspondence should be sent.

  The letter should include a statement to the effect that all authors have participated in the conception and design of the work and in the writing of the manuscript, and that they take public responsibility for it. The authors should attest to the validity and legitimacy of the data, and acknowledge that they have reviewed the final version of the manuscript and approve it for publication.

  In addition, the letter must include a paragraph that transfers copyright ownership to the *MMJ* in the event that the work is published.

- ***Manuscript preparation***—Manuscripts should be submitted to Editor, *MMJ*, 1211 Cathedral Street, Baltimore, MD 21201-5585. Manuscripts must be original material not previously published and not under consideration by another publication. An abstract of 100 to 300 words is required.

  All material, including references, tables, and legends, must be double-spaced. Pages should be numbered. (All abbreviations should be spelled out on first use.) The original manuscript plus one copy should be submitted on standard (8.5" x 11") bond paper. If at all possible, an IBM-compatible disk should be included, with the manuscript entered in a WordPerfect, Multimate, Wordstar, or ASCII format; the transmittal letter should identify the format used.

- ***References***—References are limited to those citations noted in the text. References should be numbered consecutively as they appear in the text and should be kept to a minimum (fewer than thirty-five). Personal communications and unpublished data are not acceptable. At a minimum, references should include names of all authors, complete title of the article cited, name of journal abbreviated according to *Index Medicus* (if abbreviation is not known, journal name should be spelled out fully), year of publication, volume number, and first and last page numbers. Sample references are as follows:

  1. Stevens MB. The clinical spectrum of SLE. Md Med J 1991; 10:875–85.
  2. Ropes MW. Characteristics, manifestations, and pathologic findings. In: Ropes MD, ed. Systemic Lupus Erythematosus. Cambridge, MA: Harvard University Press. 1976; 50–4.

- ***Tables***—Tables should be typed on separate sheets of paper, be numbered, and have a brief descriptive title. Data presented in tables should be self-explanatory and should supplement, not duplicate, the text; the Editor reserves the right to edit tables. Authors should be sure that statistics are consistent in both tables and text.

- ***Illustrations***—Illustrations include material that cannot be set in type. Photographic material must be submitted as high-contrast, glossy prints. Drawings and graphs must be done professionally in india ink on high-grade white drawing paper or be computer generated. Identification—including figure number, the title of manuscript, the name of corresponding author, and arrow indicating top—should be typed on a gummed label and affixed to the back of each illustration. Legends for illustrations should be typed on a separate page with numbers corresponding to those on the photographs or drawings. Recognizable photographs of patients are to be masked and should carry with them written permission for publication. Cost of printing color photographs must be borne by the author.

Checklist

- ☐ Original manuscript and one copy.
- ☐ IBM-compatable disk in WordPerfect, Multimate, Wordstar, or ASCII.
- ☐ Everything double-spaced.
- ☐ Letter of transmittal, signed by all authors, that includes release of copyright, statement of authorship responsibility, title and affiliation of all authors, and identification and phone number of corresponding author.
- ☐ Abstract of 100 to 300 words.
- ☐ Permission-to-borrow letters for any previously published illustrations or tables

- ***Permissions***—Material taken from other sources must be accompanied by written permission from both author(s) and publisher allowing the *MMJ* to reproduce the information/figure.

- ***Editorial responsibility***—All manuscripts are acknowledged upon receipt. They are subject to peer review by an editorial board and, at times, by guest reviewers in appropriate fields of medicine, to determine the originality, validity, and importance of the content and conclusions. Authors are usually notified of the status of their papers (acceptance, revision, or rejection) within 4 to 8 weeks of receipt; however, longer delays are sometimes unavoidable. Reviewers' comments will be returned with rejected manuscripts at the discretion of the Editor. All guest reviewers will remain anonymous.

  Accepted manuscripts become the permanent property of the *MMJ* and are subject to copy editing. (The *Chicago Manual of Style* and the unabridged *Random House Dictionary of the English Language* are used as style guides.) The corresponding author is sent a reprint order form and galley proofs. S(he) then has 48 hours in which to make minor changes and clear all corrections and changes with co-authors; if proofs are not returned by the specified date, they will be considered approved as typeset. ■

Books, Etc.

Book review editor:
Chris Papadopoulos, M.D.

Music, the Brain, and Ecstasy. How Music Captures Our Imagination.
Robert Jourdain. William Morrow and Company; New York. 1997.
377 pages. $25.00 (Hardback).

Robert Jourdain, a nonphysician, pianist, writer, and researcher on artificial intelligence, has written an exuberant, insightful synthesis of how simple sound becomes transformed into music deep within the brain. Physicians who appreciate music will find this book very interesting; it explains the structure and meaning of music and the reason music has the capability of touching people so deeply. Readers will derive a new and deeper understanding of the components of music. Early in the book the author describes the brain as the last frontier where the first explorers have barely established a foothold. They have encountered a dense, nearly impenetrable jungle of "conceptual ambiguity and experimental obstacles — a level of complexity never before encountered by questing minds." Jourdain speaks to the reader as if he himself has been on the journey and has returned to tell stories of wondrous vistas and discoveries that challenge the imagination. By combining anecdotes from the musical world with his understanding of the art and science of music, he has written a deeply satisfying book. In the process he touches on subjects as diverse as psychoacoustics, neurolinguistics, aesthetics, cultural anthropology, evolutionary biology, psychology, and medicine.

The book is organized into chapters by topic. The author slowly describes the developing complexity of music and how it is composed, performed, and appreciated. The first chapter relates how simple vibration becomes sound, and among other topics describes the evolution and design of the ear and the neural tracts that carry the electrical impulses of transformed mechanical vibration. In the next chapter, he explains the structure of musical tone. In this chapter, he delves deeply into the structure of "pitch space" as perceived in the Western World, being divided into 12 equal steps and out of which all of the scales are built. In a fascinating historical analysis, he traces the development and evolution of pitch space from the mathematical relations of Pythagoreanism to the tempered scale and beyond. Subsequent chapters on melody, harmony, and rhythm slowly build the components of music. He takes the same historical, cross-cultural approach in each, fixing more precisely the place of modern music. He next covers composition, performance, listening, and understanding before ending with a compelling chapter on ecstasy: how we derive pleasure from music. As Jourdain says: "[in this chapter] music and the musical knower are regarded in light of modern theories of emotion and pleasure." Jourdain chronicles music's panoply of pleasures: how we "are ravished by the beauty of instrumental sound; exult in the constructs of melody and harmony and rhythm; and derive pleasure from music's meaning."

The writing is lyrical and itself has a kind of musical quality especially in the poetic descriptions he uses: "silence is the delicious muffle of an auditory system in repose" and a rock concert is "all barricade and guillotine." The result is a finished piece of remarkable scope and creativity — like the wonder of music itself this book moves the reader. As a result, the reader will never approach music the same way again. The

author states at the outset that the understanding and enjoyment of this book does not require any prior musical or scientific knowledge. Although I think this is probably true, I also feel that those who approach with some musical and scientific understanding may have an even deeper appreciation.

One of the book's limitations is that the glossary is not extensive enough. Also, there are no reference numbers in the text to indicate the presence of the endnotes. I found this mildly annoying, although one could generally tell from the text that an endnote might be present (for instance the presence of quotes or larger quoted passages). On the other hand, there is a helpful bibliography with nearly two hundred citations for anyone who would like to read further on any of the topics covered. The careful reader will also be rewarded with practical ideas that can be put to good use. For example, acoustical studies generally reveal that the best seats in a concert hall are approximately sixty feet from the stage and somewhat off center. *Let me see, I know I put my seating chart for the Meyerhof Symphony Hall around here somewhere. . .*

PHILIP PANZARELLA, M.D., M.P.H.
Dr. Panzarella is medical director, The Franklin Square Primary Care Center ■

ER ■■■■■■■■■■■■ is a top-rated television program created by a well-known novelist and medical school graduate, Michael Crichton. As a medical show, it has generated much interest. What do you think of it? We would like to have your comments and critiques. Send them to *MMJ* Reviews, 1211 Cathedral Street, Baltimore, MD 21201. ■■■■■■■■■■■■■■

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DHMH Maryland Department of Health & Mental Hygiene

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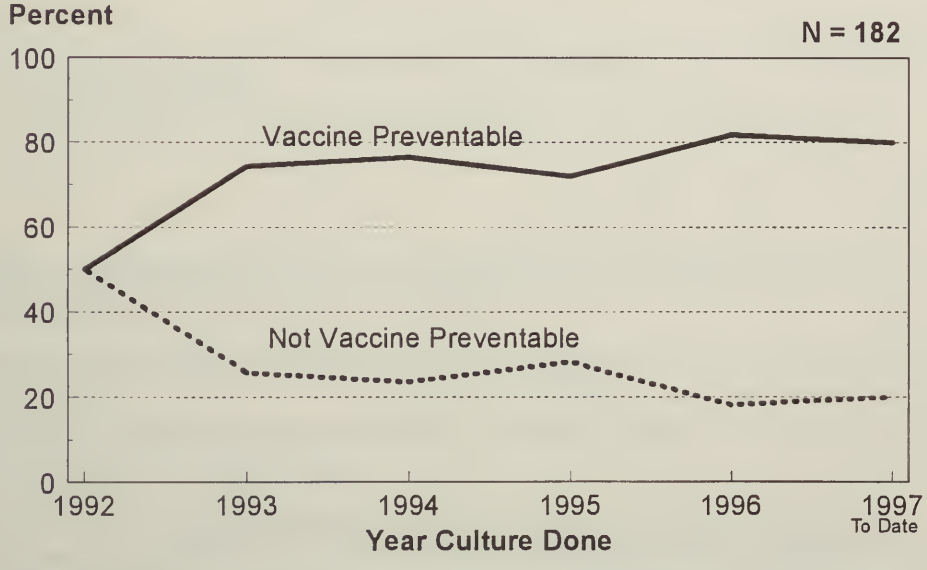
January, 1998

Meningococcal Serogroups in Maryland

In Maryland from 1992 through September, 1997, 225 confirmed cases of meningococcal disease were reported through the Maryland Bacterial Invasive Disease Surveillance (BIDS) Project. For those reports which include serogroup data, the total organisms from vaccine preventable serogroups (A, C, Y, and W 135) have increased to about 80% of cases (see graph below). Ages especially hard-hit include young children (birth through four years), and adolescents and young adults (fourteen through twenty-two years). Case fatality rates may range from 5% to as high as 25%.

Immunoprophylaxis with the quadrivalent vaccine can protect against serogroups A, C, Y, and W135 (but not B). The vaccine, containing purified suspensions of capsular polysaccharides, has been approved in the U.S. for children of 2 years and older. Indications include anyone 2 years of age and older with risk factors such as asplenia or complement component deficiencies; travelers to endemic areas; and military recruits. The American College Health Assoc. recently recommended that college students be informed of the availability of the vaccine. Safety of vaccination of pregnant women has *not* been established.

Meningococcal Serogroups in Maryland
Vaccine Preventable Versus Others



Data Source: Maryland Bacterial Invasive Disease Surveillance (BIDS) Project. During this period, serogroups are known for 182 of 225 isolates (81%).

Meningococcal Disease Fact Sheet

***Neisseria meningitidis* (the meningococcus) is a bacterium (germ) that can cause serious infections**

The meningococcus causes meningitis, an infection of the covering of the brain and spinal cord. It also causes serious infections of the blood (meningococcemia) and of other normally sterile body sites (e.g., joints). These infections may lead to death.

The meningococcus is spread by droplets or by direct contact

The meningococci are sprayed into the air through sneezing and coughing. Many people may carry the bacteria in their noses and throats, and they will not become ill - they are healthy carriers. These carriers can spread the germ to other people.

Symptoms to look for:

- High fever
- Nausea and vomiting
- Severe headache
- Stiffness and pains in the neck, shoulders, and back
- Skin rash of small bright red spots

Symptoms occur within 2-10 days (usually 3-4) days after the person has been exposed. Symptoms often begin suddenly.

See a doctor immediately for treatment

People who think they may have an infection due to the meningococcus should see a doctor immediately. Treatment with an antibiotic should be started right away to stop the infection from causing brain damage or death. Lab tests are needed to prove what kind of infection a person has.

People in close contact with a case may need an antibiotic

Preventive treatment with certain antibiotics is recommended and should not be delayed. Your doctor or health department will decide which medicine is best in your situation.

People in close contact may include:

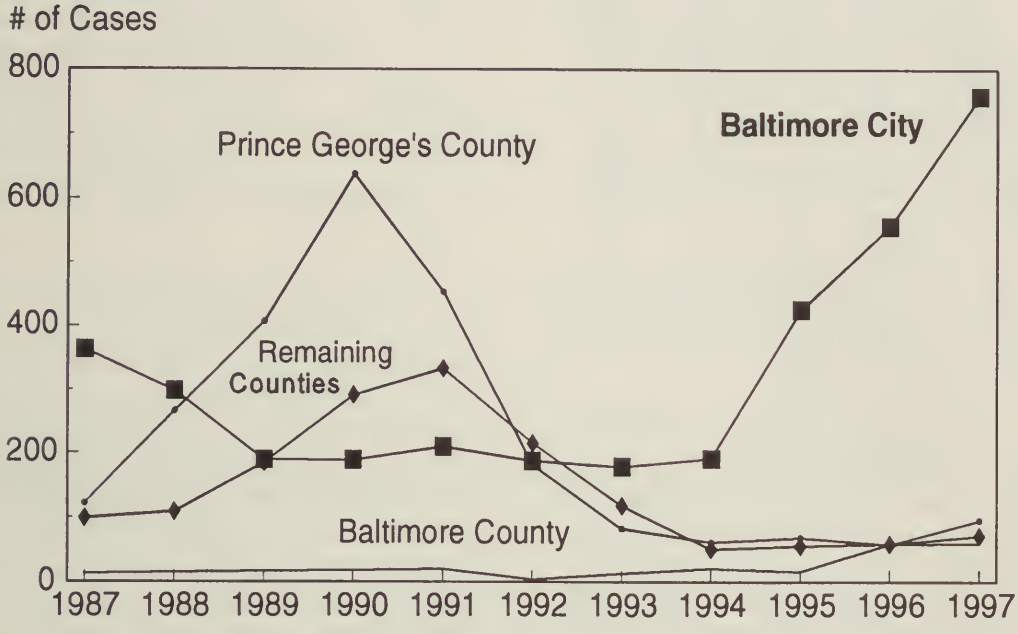
- Somebody who lives in the same house
- A person who has contact with the patient's mouth or nose secretions, such as through kissing or by sharing cigarettes, or using the same eating and drinking utensils, glasses, and plates
- A person who has done medical treatments like giving mouth-to-mouth resuscitation on the patient, or intubating or suctioning the patient
- Children sharing toys, such as in group day care centers, family child care homes, or in nurseries

Check with your doctor or your local health department for advice

Maryland Department of Health & Mental Hygiene ◆ Epidemiology & Disease Control Program May, 1996

Syphilis Rising in Baltimore

Primary & Secondary Syphilis, Maryland
1987-1997



Remember to Test and Treat:

- **Know the signs and symptoms of syphilis**
- **Test for syphilis on both symptomatic and asymptomatic patients with high risk sexual behavior**
- **Test all pregnant women at first prenatal visit and at 28 weeks gestation**
- **Do a STAT test for syphilis on all women in labor who have had no prenatal care**
- **Treat according to CDC treatment guidelines (MMWR 1993;42, No. RR-14)**
- **Report, immediately, all cases of syphilis to your local health department**
- **Educate patients about the disease and the risks, including risks associated with pregnancy**
- **Consult with your local health department on issues related to diagnosis, treatment, patient follow-up, and partner referrals**

Summary of Influenza Activity: December 19, 1997

U.S. The most recent report from the Centers for Disease Control and Prevention (CDC) indicates that 27 states and the District of Columbia have reported influenza activity confirmed by viral isolation. Ninety-seven percent of the reported isolates are influenza A, and all subtyped strains of influenza A have been identified as H3N2. Two isolates of influenza B have been reported, one in North Carolina and one in West Virginia. Reported pneumonia and influenza mortality has remained within levels expected for this time of year. Influenza morbidity reports from U.S. sentinel physicans has also remained within baseline levels for the U.S. as a whole, and for the South Atlantic region, which includes Maryland.

Maryland Laboratory confirmed influenza has been reported from only Kent County (3 cases) and Baltimore City (7 cases) to date. Confirmation has been obtained by culture or direct fluorescent antibody testing. All ten cases were identified as influenza A, but no subtyping has been completed to date. Nursing home outbreaks that have been confirmed as influenza A have occurred in Kent County (1) and Baltimore City (1). Influenza activity normally peaks in January or February, so the low levels reported to date are typical of the pattern usually seen.

Interesting Developments An influenza A/Sydney/05/97-like (H3N2) virus was isolated from a child in New York City from a specimen collected in November. This is an "antigenic drift" variant of the A/Wuhan (H3N2) strain contained in the 1997-98 influenza vaccine. Because this variant is antigenically distinguishable from the vaccine strain, it could reduce vaccine efficacy. According to the CDC, "protection could be less than optimal if this variant circulates widely."

The CDC's December 19, 1997 Morbidity and Mortality Weekly Report (MMWR) reveals that a strain of influenza virus that was previously known only to infect birds has been associated with infection and illness in humans in Hong Kong. Six additional confirmed cases and two possible cases (total nine) have since been identified. The CDC has joined an international team investigating the situation. The preliminary findings, reported in MMWR, indicate that multiple influenza A(H5N1) infections have occurred and that both the source and mode of transmission are uncertain at this time. While there is clearly concern for the pandemic potential of this virus, the CDC does not expect the Hong Kong situation to affect the current influenza season in the U.S.

Prophylaxis and Treatment Influenza vaccine still represents the best protection against influenza and it is not too late to vaccinate. Vaccine can be 70-90% effective in preventing influenza in healthy adults. Although efficacy may be reduced in the elderly and chronically ill, it remains useful in reducing serious complications and death. Vaccine is recommended for those at high risk of serious complications of influenza, and for those health-care providers and others who have frequent contact with those persons. Two antiviral drugs, amandatine and rimantadine, are useful for both prophylaxis and treatment of influenza A (but not influenza B) infections. Resistance can develop to both drugs.

Information Sources To find out the latest information about the influenza season at the national level, check out these sources: a) on the internet, world wide web, (http://www.cdc.gov/ncidod/diseases/flu/weekly.htm), b) fax back from CDC (1-888-232-3299, document #361100), or c) call the CDC influenza branch (404-639-3747). For Maryland information, try a) the world wide web (www.charm.net/~epi1/) or b) call the Division of Communicable Disease Surveillance (410-767-6712).

The Johns Hopkins Medical Institutions

All courses at the Thomas B. Turner Building unless otherwise indicated. For information on continuing medical education activities, contact the Office of Continuing Medical Education, 720 Rutland Ave., Baltimore, MD 21205, 410-955-2959, Fax 410-955-0807 (e-mail: cmenet@som.adm.jhu.edu).

Electrophysiology of the brain – a symposium in honor of Ernst Neidermeyer, M.D., sponsored by Johns Hopkins Medical Institutions, department of neurology, at Harbor Court Hotel, Baltimore. Credits: 8 Cat 1 AMA credits. Fee: $180/physicians; $85/residents, fellows, allied health professionals. **Jan. 17**

15th annual gastroenterology update: multidisciplinary approach – an exercise in interactive gastroenterology, sponsored by the Johns Hopkins University School of Medicine and Johns Hopkins Gallstone and Biliary Disease Center at Manor Vail Lodge, Vail, Colorado. Credits: 19 Cat 1 AMA credits. Fee: $495/physicians; $375/residents, fellows, allied health professionals. **Feb. 1–6**

Computed body tomography 1998: the cutting edge, sponsored by Johns Hopkins Medical Institutions, department of radiology, at Peabody Orlando Hotel, Orlando, Florida. Credits: 21 Cat 1 AMA Credits. Fee: $575/physicians; $500/residents, fellows, technologists. **Feb. 5–8**

Basic concepts in dysphagia diagnosis and management, sponsored by Johns Hopkins Medical Institutions, Johns Hopkins Swallowing Center, at Renaissance Harborplace Hotel, Baltimore. Fee: $200/physicians; $140/residents, fellows, allied health professionals. **Mar. 4**

7th annual multidisciplinary symposium on dysphagia, sponsored by Johns Hopkins Medical Institutions, Johns Hopkins Swallowing Center, at Renaissance Harborplace Hotel, Baltimore. Fee: $465/physicians; $265/residents, fellows, allied health professionals. **Mar. 5–6**

Perioperative management, sponsored by Johns Hopkins University School of Medicine, at Marriott's Marco Island Resort, Marco Island, Florida. Credits: 21 Cat 1 AMA credits. Fee: $525/physicians; $490/residents, fellows, CRNAs, and allied health professionals. **After 2/8/98** — $550 and $515, respectively. **Mar. 8–11**

Men's health 1998, sponsored by Johns Hopkins Medical Institutions, department of urology and medicine, at Renaissance Harborplace Hotel, Baltimore. Fee: $150/physicians; $95/residents, fellows, and allied health professionals. **Mar. 20**

39th annual postgraduate institute for pathologists in clinical cytopathology, sponsored by the Johns Hopkins University School of Medicine. **Course A** (Home Study) March - April. **Course B** (Johns Hopkins Medical Institutions, Baltimore) April 20-May 1. Credits: 97 AMA Cat 1 credits (plus up to 10 hours video instruction). **Registration deadline: March 20**

PET/SPECT imaging in oncology: doing the right imaging the right way, sponsored by Johns Hopkins University School of Medicine and UCLA School of Medicine, at Sunset Village, UCLA School of Medicine, Los Angeles, California. Credits: 18.5 Cat 1 AMA credits. Fee: $595/physicians; $495/residents, fellows, allied health professionals. **Mar. 26–28**

Continuously throughout the year

Visiting preceptorship in pediatric critical care medicine. Ongoing five-day preceptorship by appointment. Credits: 40 Cat 1 AMA/PRA credits. Fee: $600.

The department of radiology and radiological sciences offers several courses in abdominal and obstetrical ultrasound. Info: P. Williams, 410-955-3169.

Visiting physicians. Offered throughout the year for experience in the lab and participation in read-in sessions; by appointment only. Credits: 40 Cat 1 AMA/PRA credits. Fee: $500.

Johns Hopkins medical grand rounds. Accredited audiovisual continuing education series of case discussions for clinicians; 30 topics per year in five bimonthly programs. Individual and group subscriptions. Credits: 40 Cat 1 AMA/PRA credits. Info: 410-955-3988.

Johns Hopkins Medical Institutions (continued)

Johns Hopkins sports medicine grand rounds. Accredited continuing education series of presentations on sports medicine topics applicable to primary care and orthopaedic surgery. Discussions first Thursday of each month. Info: Amy Taylor, 410-383-0600.

University of Maryland School of Medicine

For each course, additional information may be obtained by contacting the Program of Continuing Education, University of Maryland School of Medicine, Room 14-011, BRB, 655 W. Baltimore St., Baltimore, MD 21201 (410-706-3956), or by calling the phone number listed after a specific program. Fax 410-706-3103.

Diagnostic and therapeutic advances in glaucoma management, sponsored by the Maryland Center for Eye Care, University of Maryland School of Medicine. Fee: $125/MDs and PhDs; $65/residents; $85/fellows. Information: Nancy Cook, 410-328-5929, Fax 410-328-6346, E-mail NCOOK@aol.com. **Feb. 27**

Self-Directed CME Activities

CD-ROM-based interactive multimedia radiology teaching file for Mac or PC w/single-user licenses (SUL), site licenses (SL), or multisite licenses (MSL). Credits: 60 Cat 1 AMA credits. Expires 9/98. Fee: $149/SUL, $395/SL, $595/MSL. Info: 410-528-8502.

Academic rounds and conference. Each academic department within the school of medicine has a series of lectures and/or seminars available to physicians. Cat 1 AMA credits available.

Miscellaneous

Spiritual wisdom and the practice of psychotherapy, sponsored by Sheppard Pratt Health System, at the Conference Center at Sheppard Pratt, Baltimore. Info: Barbara Johnson, professional education programs, Sheppard Pratt, 6501 N. Charles St., Baltimore, MD 21285-6815, 410-938-4598, Fax 410-938-4596. **Jan. 16–17**

Breast imaging today and tomorrow, is sponsored by the International Institute for Continuing Medical Education, at The Breakers Resort Hotel, Palm Beach, Florida. Credits: 25.25 Cat 1 AMA credits. Fee: $650/physicians; $400/residents, fellows, technologists. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Jan. 19–23**

4th annual neuroradiology: a comprehensive review, is sponsored by the University of California, San Diego, at The Ritz-Carlton Hotel, Palm Beach, Florida. Credits: 24 Cat 1 AMA credits. Fee: $650/physicians; $425/residents, fellows, technologists. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Jan. 19–23**

Clinical breast examinations using mammacare technique – a practicum for physicians, sponsored by the Medical and Chirurgical Faculty of Maryland, at Potomac Physicians, P.A., Baltimore. Info: Jade Leung, 410-539-0872 or 1-800-492-1056. **Jan. 21**

6th annual musculoskeletal MR course, is sponsored by the University of California, San Diego, at The Breakers Resort Hotel, Palm Beach, Florida. Credits: 22.5 Cat 1 AMA credits. Fee: $595/physicians; $350/residents, fellows, technologists. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Jan. 26–30**

Cancer prevention in community practice, sponsored by the Medical and Chirurgical Faculty of Maryland, at Northwest Hospital Center, Baltimore County. Free CME credits available. Info: Carol Schwartz, 410-539-0872 or 1-800-492-1056. **Jan. 28**

Miscellaneous (continued)

Clinical breast examinations using mammacare technique—a practicum for physicians, sponsored by the Medical and Chirurgical Faculty of Maryland, at Liberty Medical Center, Baltimore. Info: Jade Leung, 410-539-0872 or 1-800-492-1056. — **Jan. 28**

MRI at Snowbird, sponsored by The University of California, San Diego, at The Cliff Lodge, Snowbird, Utah. Credits: 20 Cat 1 AMA credits. Fee: $550/physicians; $400/residents, fellows, technologists. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). — **Feb. 1–6**

Cardiovascular conference at Snowshoe, sponsored by the American College of Cardiology, at Mountain Lodge Conference Center, Snowshoe, West Virginia. Credits: 14.5 Cat 1 AMA credits. Info: 800-253-4636, ext. 695, Fax 301-897-9745. — **Feb. 2–4**

Clinical breast examinations using mammacare technique—a practicum for physicians, sponsored by the Medical and Chirurgical Faculty of Maryland, at Med Chi, 1211 Cathedral Street, Baltimore. Info: Jade Leung, 410-539-0872 or 1-800-492-1056. — **Feb. 4**

Diagnostic and interventional breast imaging, sponsored by the International Institute for Continuing Medical Education, at The Ritz-Carlton Resort Hotel, Cancun, Mexico. Credits: Approx. 26 Cat 1 AMA credits. Fee: $695/physicians; $495/residents, fellows, technologists. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). — **Feb. 9–12**

PACS and teleradiology: what you need to know, sponsored by the University of Florida, College of Medicine, at Disney's Contemporary Resort, Orlando, Florida. Credits: 20 Cat 1 AMA credits. Fee: $600/physicians, scientists, and company reps; $500/residents, fellows, technologists, full-time military. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). — **Feb. 9–12**

Clinical breast examinations using mammacare technique—a practicum for physicians, sponsored by the Medical and Chirurgical Faculty of Maryland, at Physicians Memorial Hospital, La Plata, Maryland. Info: Jade Leung, 410-539-0872 or 1-800-492-1056. — **Feb. 11**

Imaging in the acute care setting, sponsored by the International Institute for Continuing Medical Education, at Fiesta Americana Resort Hotel, Cancun, Mexico. Credits: Approx. 26 Cat 1 AMA credits. Fee: $695/physicians; $495/residents, fellows, technologists. $695/physicians; $495/residents, fellows, technologists. — **Feb. 16–20**

Up to date radiology 1998, sponsored by the University of California, Irvine Medical Center, at the Four Season's Resort Hotel, Newport Beach, California. Credits: Approx. 26 Cat 1 AMA credits. Fee: $695/physicians; $495/residents, fellows, technologists. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). — **Feb. 16–20**

Breast imaging today and tomorrow, sponsored by The International Institute for Continuing Medical Education, at Disney's Grand Floridian Resort, Orlando, Florida. Credits: 23 Cat 1 AMA credits. Fee: $695/physicians; $495/residents, fellows, mammographers. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). — **Feb. 16–20**

Imaging in the acute care setting, sponsored by The International Institute for Continuing Medical Education, at the Fiesta Americana Resort Hotel, Cancun, Mexico. Credits: 22 Cat 1 AMA credits. Fee: $695/physicians; $500/residents, fellows, technologists. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). — **Feb. 16–20**

Clinical breast examinations using mammacare technique—a practicum for physicians, sponsored by the Medical and Chirurgical Faculty of Maryland, at Washington County Hospital Association, Hagerstown, Maryland. Info: Jade Leung, 410-539-0872 or 1-800-492-1056. — **Feb. 18**

Miscellaneous (continued)

Cardiovascular health: coming together for the 21st century – a national conference, sponsored by the National Heart, Lung, and Blood Institute, the Cardiovascular Disease Outreach, Resources, and Epidemiology Program, the University of California San Francisco, and the California Cardiovascular Disease Prevention Coalition, at the Hyatt Regency Embarcadero Hotel – on the Waterfront, San Francisco, California. Fee: $350. Info:415-476-5808. **Feb. 19–21**

Neuro/ENT imaging: review and update, sponsored by the International Institute for Continuing Medical Education, at the Ritz-Carlton, San Juan Hotel and Casino, Isla Verda, Puerto Rico. Credits: 26 Cat 1 AMA credits. Fee: $695/physicians; $495/residents, fellows, technologists. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Feb. 19–23**

Clinical breast examinations using mammacare technique—a practicum for physicians, sponsored by the Medical and Chirurgical Faculty of Maryland, at Shady Grove Adventist Hospital, Rockville, Maryland. Info: Jade Leung, 410-539-0872 or 1-800-492-1056. **Feb. 25**

38th annual meeting and scientific session, sponsored by the Maryland Thoracic Society, the medical arm of the American Lung Association of Maryland, at the Renaissance Harborplace Hotel in Baltimore. Info: Ann Eder, 410-560-2120. **Mar. 1**

Practice guidelines and outcomes data in oncology, sponsored by the National Comprehensive Cancer Network (NCCN), at the Marriott Harbor Beach Hotel, Fort Lauderdale, Florida. Info: 516-424-8900, ext. 300. **Mar. 1–4**

13th annual postgraduate magnetic resonance imaging, sponsored by the University of California, San Diego, at the Hotel Del Coronado, San Diego, California. Credits: 28 Cat 1 AMA credits. Fee: $696/physicians; $495/residents, fellows, technologists, nurses. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Mar. 1–6**

Clinical breast examinations using mammacare technique—a practicum for physicians, sponsored by the Medical and Chirurgical Faculty of Maryland, at Laurel Regional Hospital, Laurel, Maryland. Info: Jade Leung, 410-539-0872 or 1-800-492-1056. **Mar. 4**

PHYSICIAN'S RECOGNITION AWARD

During October and November 1997, the physicians listed below received the American Medical Association (AMA) Physician's Recognition Award. Established in 1968, the award's purpose is to encourage physician participation in continuing medical education and to recognize those physicians who have voluntarily completed programs of continuing medical education.

Patricia Anne Bray
Clark R. Brill
Juei-Ling Chang
Robert Alan Cordes
Seth R. Eaton
Noel Stephen Gressieux
Myles B. Koby
Sheldon R. Mandel
Allison Lee Oldfield
James Anthony Rossi
Donald W. Sample
Vithaldas J. Shah
James J. York

Miscellaneous (continued)

Thoracic imaging 1998, sponsored by the Society of Thoracic Radiology, at the Ritz-Carlton Isla Verde, San Juan, Puerto Rico. Fee: $650/physicians; $350/resdients, fellows, technologists. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Mar. 8–12**

Update in general diagnostic imaging/breast imaging, sponsored by the University of Chicago, at Boca Raton Resort Hotel & Spa, Boca Raton, Florida. Credits 34.50 (18.75 mammography) Cat 1 AMA credits. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Mar. 9–13**

Winter multidisciplinary course: highlights in radiology, medicine, and surgery, sponsored by Duke University Medical Center, at the Silvertree Hotel, Snowmass, Colorado. Credits: 16 general radiology (6 mammography) Cat I AMA credits. Fee: $595/physicians; $375/residents, fellows, technologists. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Mar. 15–20**

Breast imaging and interventions: basics, conflicts, and controversies, sponsored by the International Institute for Continuing Medical Education, at the Ritz-Carlton Resort Hotel, Phoenix, Arizona. Fee: $695/physicians; $495/others. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Mar. 16–19**

1st annual meeting of the American Society of Spine Radiology: practical spine imaging symposium, sponsored by the American Society of Spine Radiology, at the Fiesta Americana Coral Beach Resort, Cancun, Mexico. Credits: 18 Cat 1 AMA credits. Fee: $350/ASSR members; $550/physician non-ASSR members; $250/residents, fellows, technologists. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Mar. 18–21**

Internal derangements of joints: MR imaging, sponsored by the International Institute for Continuing Medical Education, at the Ritz-Carlton Hotel, Atlanta, Georgia. Credits: 19.5 Cat I AMA credits. Fee: $595/physicians; $395/residents, fellows, technologists. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Mar. 20–22**

4th annual course on management of the HIV-infected patient: a practical approach for the primary care practitioner, sponsored by the Center for Bio-Medical Communication, Inc., at the Crowne Plaza Manhattan Hotel, New York. Credits: 20 Cat I AMA credits. Fee: $495/physicians; $295/physicians in training and allied health professionals (for registrations by 2/5/98). Info: 201-385-8080, Fax 201-385-5650. **Mar. 20–22**

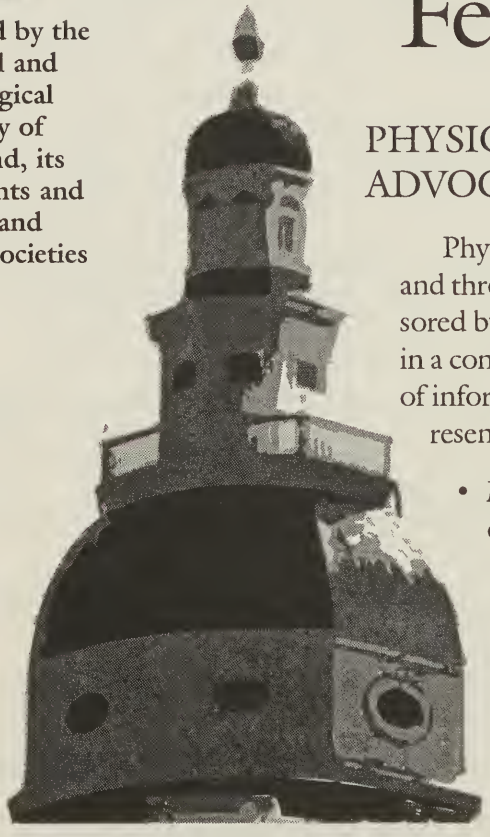
1st annual course on clinical decision in urogynecology, sponsored by the Center for Bio-Medical Communication, Inc., at the Crowne Plaza Manhattan Hotel, New York. Credits: 10.5 Cat 1 AMA credits. Fee: $575 (after 1/15/98). Info: 201-385-8080, Fax 201-385-5650, E-mail scunniffe@cbcbiomed.com. **Mar. 20–22**

Type 2 diabetes in the elderly, sponsored by the American Diabetes Association of Arizona with the National Institute of Diabetes and Digestive Kidney Disease, at the Buttes Resort, Tempe, Arizona. Info: Fax 602-861-0542. **Mar. 27–29**

Clinical infectious disease course, sponsored by the Center for Bio-Medical Communication, Inc., at The Plaza Hotel, New York, NY. Credits: 18.75 Cat 1 AMA credits. Fee: $645/physicians; $475/physicians in training and allied health professionals (after 1/16/98). Info: 201-385-8080, Fax 201-385-5650, E-mail jrosenberg@cbcbiomed.com. **Mar. 27–29**

PHYSICIANS' Day in Annapolis February 11, 1998

Sponsored by the Medical and Chirurgical Faculty of Maryland, its components and Maryland specialty societies



PHYSICIANS for patients

PHYSICIANS ARE THE BEST PATIENT ADVOCATES.

Physicians' Day is a chance for you to make your voice heard, and through you, your patients. It is a special opportunity sponsored by Med Chi for you to communicate with state legislators in a convenient, time-saving way. You are an irreplaceable source of information and insight for legislators and are needed to represent your patients to the Maryland General Assembly.

- Meet with legislators to begin or strengthen a dialogue on health care issues and legislation
- Describe from a physician's unique perspective how past and pending legislation has affected or will affect patients and the practice of medicine
- Promote an even greater awareness of public health concerns and suggest possible solutions
- Encourage legislators to communicate their concerns regarding health care legislation

Med Chi will provide you with a comprehensive Physicians' Day information packet to assist you in this special event.

Fax Back Reply Form

❑ Yes, I will join my colleagues in Annapolis for Physicians' Day on February 11, 1998.

I live in legislative district number _____ in _____ _____County or Baltimore City..

I know the following legislators: _____

_____

I am a member of the following medical specialty society: _____.

Name:_____

Fax:_____

Phone:_____

e-mail address:_____

Return to:

Medical and Chirurgical Faculty of Maryland
Attn: Gene Ransom, 1211 Cathedral St.
Baltimore, MD 21201
Fax: 410-547-0915 Phone: 410-539-0872

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- Cost for nonmembers is $8.00 per 35 characters or portion thereof, with a minimum cost of $50.00 per advertisement.
- Advertisements placed for the benefit of an HMO or a hospital are charged the nonmember rate.
- Advertisements for services (e.g., collection agencies) or for items not related to the practice of medicine (e.g., real estate sales) are limited to a maximum of three placements per calendar year.
- Spouses of deceased members are entitled to two complimentary insertions for the disposal of the deceased physician's practice or equipment.
- Box numbers are provided free of charge.
- Advertising copy and payment (checks should be made out to *Maryland Medical Journal*) should be sent seven weeks prior to the first of the month in which the advertisement is to appear.

Box replies, advertising copy, and prepayments should be sent to:

Vivian Smith, *MMJ*, 1211 Cathedral St., Baltimore, MD 21201-5585

For more information, call Vivian Smith at 410-539-0872 or 1-800-492-1056, ext 308.

Cite SEER

Through a series of case reports, authors demonstrate the variety of medical problems that can impair a musician's ability to perform (*Can Fam Physician* 1995;41:2121–2128). Five cases — bilateral shoulder pain, sensory loss in forearm and hand, shoulder girdle pain and sensory loss, forearm pain, and fibromyalgia — are detailed, and the authors discuss examination and treatment techniques. Authors also stress that educating the musician after recovery from a medical problem is essential to preventing recurrence, stating that "[p]laying without causing symptoms, playing regularly to maintain endurance, appropriate warm-up periods, proper instrument maintenance, and maintaining general physical fitness all help maintain a recovered artist's ability to continue playing."

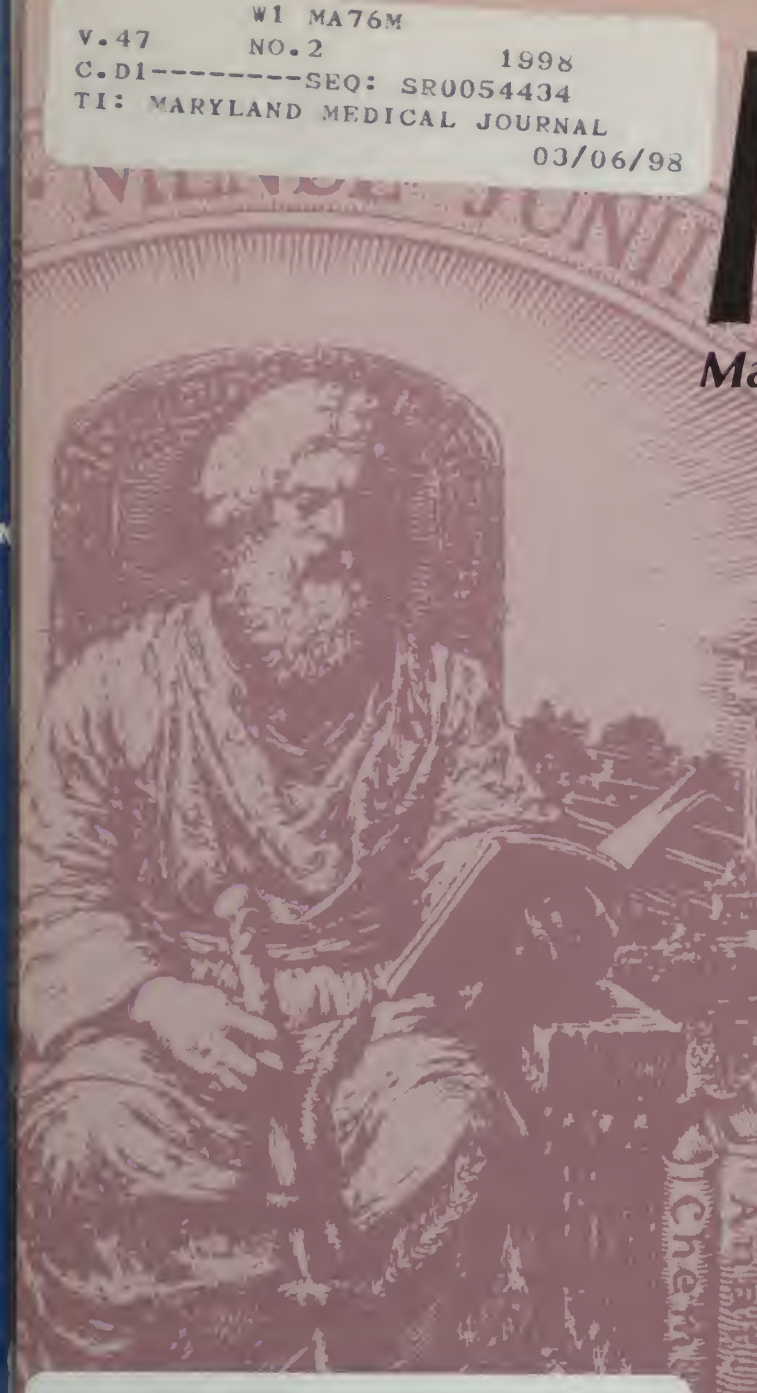
Seitsalo et al. surveyed the Finnish National Ballet to study the prevalence of spondylolysis and spondylolisthesis among the dancers (*J Dance Med Sci* 1997;1:51–54), and determined through lumbar spine radiographs that 32% (19/60) of the subjects had spondylolysis. The prevalence rate was determined to be about five times that of the general Finnish population, with no statistical difference between males and females. Authors found "that dancers with spondylolysis did not have statistically more severe low back symptoms than other dancers." They concluded that a dancer with spondylolysis should not be advised to discontinue his or her career based on such a diagnosis.

A speech language pathologist offers a perspective on the developmental and psychosocial issues involved in the care of a singing/acting child (*Journal of Voice* 1997;11:130–134). Profiles of children at risk are provided and clinical approaches to helping assess and treat young people who's ability to perform has been impaired are discussed. The author concludes that a performance-oriented child who has sought the help of a speech-language pathologist is different from other children and that "although the voice symptoms that need to be addressed are often similar to those addressed with other clients, the approach to intervention must be tailored to the unique needs of this population."

Traumatic injuries to the hands or upper extremities can seriously affect a musician's ability to perform (*Work* 1996;7:81–87). Demographic and clinical data is presented for 222 instrumentalists who experienced traumas including fractures/dislocations, sprains/strains, contusions/crash injuries, and lacerations/open wounds. Over 30% of the injuries were related to sports participation. Focusing on the end results for these patients, a group of patients who had a complete healing and a return to their "highest possible level of musical function" were studied (201). Of these, 11.4% significantly changed the way they played their instruments and three performers gave up performing.

MMJ

Maryland Medical Journal



Original Articles

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MMJ
Maryland Medical Journal
FEBRUARY/MARCH 1998 • VOL 47 NO 2

ORIGINAL ARTICLES

DEPARTMENTS

MMJ
Maryland Medical Journal

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Mark Your Calendar for

MED CHI'S 1998 ANNUAL MEETING

May 1-2, 1998

see details on page 55

Dr. Jeffrey Hausfeld's article — "Hoarseness — current concepts on etiologies and treatment alternatives"— was scheduled to appear in the January 1998 issue of the *MMJ*, which was dedicated to the subject of performing arts medicine. The *MMJ* regrets the oversight.

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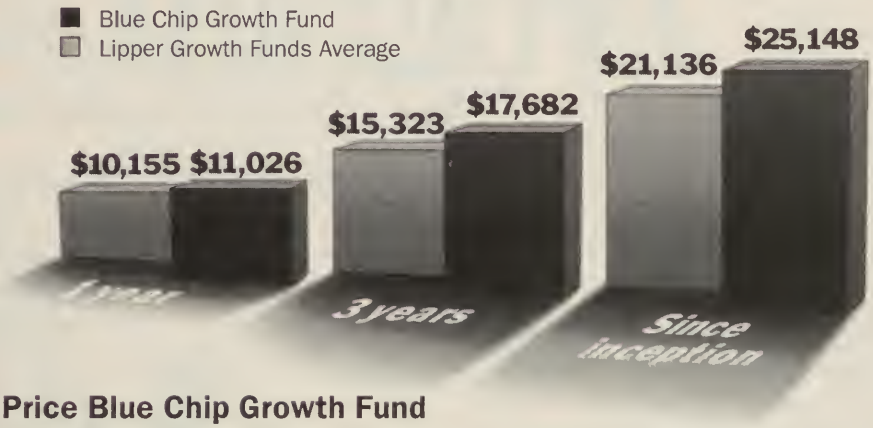

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Thank you to the many Med Chi doctors who have already volunteered for **The Mentor Program**

The Maryland State Medical Student Association thanks you for your help.

The Mentor Program will enable MSMSA members (medical student member of Med Chi) to contact you and ask questions about your specialty, your practice, HMO's, or other general advice about the medical profession. You tell us when you are available, so you will not be contacted when you are busy. We believe with your help this program will be popular with medical students and will fill a vital information gap in medical education. Especially good connections may blossom into rewarding mentoring relationships.

Please fill out the following application and FAX it to Med Chi at (410)727-5967, or MAIL it to Russel Kujan, Med Chi, 1211 Cathedral Street, Baltimore, MD 21201. Questions? Contact Russel Kujan (410) 539-0872, extension 344 or (800) 492-1056, extension 344. Thank you.

Please print or type your name clearly.

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Wednesday	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9
Thursday	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9
Friday	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9

Are you available on Saturdays? If yes, indicate hours: _____

List any preferences or considerations for student who contact you: _____

_____

Optional: Undergraduate College/University: _____

Medical School Attended: _____

List your activities at Med Chi: _____

SAVE THE DATE — MAY 1-2, 1998!!

1998 Med Chi Annual Meeting — Baltimore Convention Center

Headquarters Hotel—Sheraton Inner Harbor—closest hotel to the convention center

FRIDAY–AM

- Med Mutual risk management (medical ethics)
- The Human Genome Project
- ALLIANCE MEETING, LUNCHEON AND FASHION SHOW

FRIDAY–PM

- KEYNOTE LUNCH PRESENTATION–MARK SHIELDS
- HOUSE OF DELEGATES MEETING
- REFERENCE COMMITTEES
- Negotiating the Managed Care Maze: Strategies for Physicians and Their Performing Arts Patients
- Land Mines: Pseudo Protectors of Peace and Perpetrators of Disaster
- Killer Addictions: Advances in the Treatment of Alcoholism and Smoking Cessation Treatment for the Busy Clinician
- Drug-resistant Infections
- American Heart: Women's Cardiovascular Health Issues
- WELCOME RECEPTION

SATURDAY

- BREAKFAST WITH THE PROFESSOR
- 3 sections OB/GYN
- Anesthesia
- Addictions
- Radiology
- Sight Preservation: Implications for the Generalist
- The Future of the Medical Profession
- COMPONENT LUNCHES/CAUCUSES
- HOUSE OF DELEGATES MEETING
- Orthopaedics
- Anesthesiology
- Pain management
- Medical records
- Update on Emergency Medical Services
- PRESIDENT'S BANQUET

QUESTIONS? Call

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Editorial

The *Maryland Medical Journal* — To Be or Not to Be

Your editor first learned on January 10 that the Med Chi House of Delegates would be asked to eliminate the printing of your journal and instead place the publication on the Internet. This was to be acted upon one week later and was our only opportunity to register the editorial board's unanimous opposition to this proposed change.

While we have been informed that prior to this action focus groups had been surveyed and little support for the printed version had been found, we have been advised by other sources that these focus groups consisted of only 16 Med Chi members, all from the greater Baltimore and Washington, D.C. areas.

Quoting from what was introduced by the Board of Trustees in reference to the budget, "Among the items contained in this budget is a recommendation from the Board of Trustees to undertake a major change in the format of the *MMJ*, under which the *MMJ* would become a website-based journal and the printed journal would cease, effective May 1, 1998."

It is our feeling that not enough of our members would read a journal limited to the Internet. Also, very few potential authors would be willing to submit articles for a publication that appears solely on the Internet.

Presently, articles in *MMJ* are listed in the Index Medicus. If the printed version of the journal is discontinued, we will lose this listing. Should we later decide to return to the printed version of the journal, reacceptance in the Index Medicus would be a long and arduous journey.

We have learned that the approximate cost of the journal is $10/per year, per member. At the time of this writing we are budgeted for two additional issues (after the one you are reading) after which time there will be no further printed issues of the *MMJ*.

More recently, there seems to have been some change in this thinking. Quoting, "The House of Delegates adopted the 1998 budget as presented, and directed the Board of Trustees to appoint a task force to study the feasibility, make proposals and recommendations for an economical version of a hard copy *MMJ*. The task force should also seek to investigate the feasibility of a cooperative publishing effort with organizations and/or institutions such as The Johns Hopkins University and The University of Maryland who may have an interest in assuring a state-supported hard copy medical journal and report back to the House of Delegates no later than the September 1998 House of Delegates meeting."

Beverly Collins, M.D., has been appointed to head this task force. Your president has suggested that the task force complete its work by the annual meeting in May. This would certainly be a more practical date, since planning each issue of the *MMJ* requires a number of months. If the final decision is left in limbo too long, even if it were decided to continue the *MMJ* in its hard copy form, the journal have suffered irreparable harm.

Letting your representatives know how you feel on this subject NOW would be most helpful.

Marion Friedman, M.D.
EDITOR

Alan D. Fix, M.D., M.S., and colleagues published an article in the January 21, 1998, issue of *JAMA* in which they conclude that many physicians are prescribing unnecessary treatments for tick bites and Lyme disease that are ineffective and costly. The authors assessed the costs and pattern of serologic testing and antibiotic therapy for tick bites and Lyme disease in Eastern Maryland, where tick bites are prevalent. The study included 232 patients. Dr. Fix is from the University of Maryland School of Medicine.

Roger Sherwin, M.B., B.Ch., and **Thomas R. Price, M.D.**, published an editorial in the December 24/31, 1997, issue of *JAMA*, to accompany an article that suggested some types of fat were associated with reduced stroke risk in men. The authors felt the study's findings are crucial because of current dietary guidelines calling for limitation of total fat to 30% of calories and saturated fat to 10%. The authors say this study supports a diet low in saturated fat but high in monounsaturated fat. The editorial calls the study intriguing and indicates that further research is indeed implicated. Mr. Sherwin and Dr. Price are from the University of Maryland School of Medicine.

Lee Crandall Park, M.D., recently published a chapter entitled "Personal Intelligence" in *Psychological Mindedness: A Contemporary Understanding*, published by Lawrence Erlbaum Associates in 1997. In this chapter the author reviews etiology and clinical characteristics of two personality disorders – borderline and narcissistic personality disorders. Dr. Park is an associate professor of psychiatry, Johns Hopkins University School of Medicine.

Gary D. Plotnick, M.D., is lead author of a study published November 26, 1997, in *JAMA*, reporting that vitamins C and E temporarily block some harmful effects of high-fat meals. Authors studied 20 healthy hospital employees between the ages of 24 and 54 looking for the short-term effects of single high-fat meals on endothelial function. It was found that a single high-fat meal temporarily decreases endothelial function for two to four hours in persons with normal cholesterol levels, possibly through the accumulation of triglyceride-rich lipoproteins. They write: "Pretreatment with antioxidant vitamins eliminated the decrease in endothelial function following the high-fat meal, but did not increase vasodilation after the low-fat meal. This finding suggests that a high-fat meal impairs endothelial function through an oxidative stress mechanism that is blocked by pretreatment with antioxidant vitamins." Dr. Plotnick is from the University of Maryland School of Medicine.

Stephen Meltzer, M.D., is one of the authors of a study published in the October 1997 issue of *Nature Genetics* identifying a link between the gene PTEN and endometrial cancer. The study's findings suggest that up to 50% of all endometrial cancers may contain a mutation in this gene. Dr. Meltzer is professor of medicine, molecular biology and pathology and co-director of the GI Oncology Program at the University of Maryland Greenebaum Cancer Center.

William A. Briggs, M.D., was lead author of an article published in the *Journal of Clinical Pharmacology* and in September 1997 presented an award for most promising article of the past year. The article describes how researchers studied 16 patients with various diseases of the glomerulus. Different combinations of glucocorticoids and cyclosporine were tested on patients' white blood cells in tissue culture plates, and a wide ranges of responses were found among the patients. The authors concluded that such tests might assist physicians in developing a treatment strategy for individual patients. Other authors on the article were **Zu-Hua Gao, M.D., Luis F. Gimenez, M.D., Paul J. Scheel, Jr., M.D., Michael J. Choi, M.D., and James F. Burdick, M.D.** The authors were from Johns Hopkins Medical Institutions where Dr. Briggs is an associate professor of nephrology.

Hoarseness—current concepts on etiologies and treatment alternatives

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ABSTRACT: *The care of the human voice has challenged medical practitioners for centuries. Over the last 25 years we have seen significant advancements in the diagnosis and treatment of vocal disorders. This article is an overview of the more common voice disorders encountered in clinical practice and the diagnostic and management alternatives currently available. A thorough understanding of these conditions can lead to a prompt diagnosis and improved clinical outcomes in all patients, especially professional voice users. The insights presented are compiled through the eyes of a clinician and the heart of a performer.*

Take a moment to think about this. Each time you open your mouth to voice an utterance, your brain has to send thousands of electrical signals to the muscles of your abdomen, your diaphragm, your chest wall, your voice box, and all the muscles of your throat for you to produce a voice that sounds normal to you and others. Malfunction at any site of this intricate web can produce an abnormal or hoarse voice. When our voice does not sound normal to our own ear, we begin to use muscles inappropriately in order to compensate for the abnormal voice; this is a major cause of vocal dysfunction.

Voice is a sound that is produced when air passes from the lungs through the larynx when you exhale. Think of your voice as having three basic components. The first is the power source. This includes the muscles of expiration (diaphragm and chest musculature), the abdominal musculature, and the lungs. The power source will allow a person to have enough air to produce vibrations of the vocal folds that will produce a normal voice. The power source can determine the intensity or loudness of the voice as well as the ability to speak or sing over a long period of time. The second

component of the vocal mechanism is the oscillator and this is the larynx itself. As air passes gently through the vocal folds, it causes them to vibrate producing a sound we call voice. Changes in the tension of these vocal folds can change the pitch of one's voice. The third component of vocal production is the resonators, which include all of the structures and musculature above the larynx up to the mouth and the nose. By changing the resonators of our upper respiratory tract, we can change the tone or quality of our voice. You can easily see that by integrating the functions of the power source, oscillator, and resonator, we can produce a finely tuned instrument that will allow us to convey our thoughts, ideas, and emotions through our speaking and singing voices. We often take our voices for granted, but the vocal mechanism is susceptible to misuse, environmental irritants, and daily stresses. Common voice complaints that are of little consequence to most patients may be disabling to the professional voice user.

Have you ever had the experience of listening to a long-lost friend on the telephone for just a few seconds and immediately recognizing who the person was? This is because the human voice is as distinctive as our fingerprints. There are a number of speech and voice behaviors that act in combination to comprise our vocal identities. This includes the rhythm of our speech, including our voice inflections, how many words we speak per minute, the loudness of our voices, the relative tension or relaxation of our voice, and the clarity of our speech articulation. Pitch is referred to as the apparent predominant frequency sounded by the acoustical source of our larynx. The relative highness or lowness of the voice helps us to distinguish it from others. Timbre refers to the characteristic quality of the voice independent of either pitch or loudness. Resonance refers to the amplification or reverberation of speech sounds by the cavities of the nose, sinuses, pharynx, larynx, and upper thorax. The position of the structures of the upper airways and oropharynx continually changes as we speak, which further helps to define our vocal identity.

Causes of hoarseness can range from simple inflammation, overuse, incorrect use of the voice, infections and inflammatory disorders to a tumor. In an adult, hoarseness that is not accompanied by other symptoms and lasts for more than two weeks requires a medical evaluation. Hoarseness that is experienced in association with other medical symptoms (i.e., neurologic symptoms, severe dysphagia, persistent upper respiratory infections, hemoptysis) requires more prompt medical attention.

Probably the most common cause of hoarseness is a cold, virus, or bacterial infection that causes swelling of the vocal folds and upper respiratory tract mucosa. This is usually self-limiting and will generally resolve with proper hydration and some voice rest. The common viral agents are rhinovirus, adenovirus, and respiratory syncytial viruses. If hoarseness persists longer than one week, then the possibility of secondary bacterial invasion by respiratory pathogens should be considered. This would include *Moraxella catarrhalis* (which occurs in 50% of the cases), *Haemophilus* (occurs in 15% of the cases), and *Pneumococcus*, *Streptococcus*, *Staphylococcus*, *Mycoplasma*, and *Pertussis*. Aspirin and non-steroidal anti-inflammatory agents should be avoided in these conditions because they may predispose to vocal fold hemorrhage. Significant vocal fold hemorrhage may result in permanent scarring and subsequent alterations of the normal vibratory capacity of the larynx. The use of an appropriate antibiotic is indicated in bacterial infections of the upper respiratory tract.

People who suffer from chronic sinusitis, with its associated post-nasal drainage, can also have hoarseness from chronic throat-clearing and the irritation of the sinus drainage onto the vocal folds. Therapy here is directed at clearing the acute or chronic infection of the paranasal sinuses. Patients with allergic rhinitis can also have irritating effects on the larynx. Here the therapy is to control the amount of post-nasal drainage by the use of antihistamines and intranasal steroid sprays. Antihistamines alone, however, without proper hydration, can cause dryness of the respiratory mucosa and prolong hoarseness in certain instances (laryngitis sicca). The addition of mucolytic agents such as guaifenesin, increased oral hydration, and steam inhalation are usually helpful in this regard.

Another common cause of hoarseness is laryngitis, a benign inflammation of the vocal folds resulting from overuse or straining such as screaming at a football game or giving day-long speeches. Hoarseness from vocal abuse is initially treated with complete or relative voice rest. Patients should be cautioned that whispering and whistling can cause further mucosal damage to already injured vocal folds. If a person continues to abuse his or her voice and has persistent hoarseness then nodules (calluslike growths) or polyps can develop on the vocal folds. These lesions prevent proper glottic closure and disrupt normal mucosal waves, resulting in hoarseness, vocal fatigue, and a breathy quality to the voice. These can be treated either with intensive speech therapy, oral steroids, or, as a last resort, surgical removal. Professional voice users are usually not plagued with chronic hoarseness because they have proper training in how to use the three components of their vocal mechanism without straining the system.

Patients who exhibit persistent hoarseness, chronic irritative cough, and constant throat-clearing may suffer from gastroesophageal reflux disease (GERD) and reflux laryngitis. This occurs when the acid from the stomach refluxes up the esophagus and bathes the larynx, causing irritation and inflammation. Unlike classic symptoms of reflux, patients

who have reflux laryngitis most times do not experience the heartburn and acid taste that usually characterizes this disorder. These patients may experience hoarseness upon arising in the morning, halitosis, or may have a persistent sore throat or foreign body sensation in their throat. Modification of the diet along with oral antacids may result in a dramatic improvement in patients with laryngopharyngeal reflux (LPR). Many times stronger antireflux medications (i.e., Propulsid, Prevacid) are necessary to control the symptoms and improve the hoarse voice. In many instances of acute inflammatory processes affecting the larynx, patients will be placed on antireflux medications prophylactically to prevent further mucosal injury. Other eating disorders, such as bulimia, can have significant deleterious effects on the voice secondary to small focal hemorrhages as well as LPR.

A variety of neurologic disorders can cause hoarseness. Unilateral vocal cord paralysis can be caused by a virus or autoimmune process that attacks one of the laryngeal nerves that supplies motion to the larynx; blunt or penetrating injuries to the neck; stroke; surgery of the thyroid gland, cervical spine, or carotid artery; or multiple sclerosis. Cancers of the lung, esophagus, thyroid, and other head and neck tumors can also produce vocal cord paralysis by affecting the nerves leading to the vocal folds. New surgical techniques that can medialize (make the fold come more toward the midline) the affected vocal fold can result in improved vocalization and prevention of aspiration. Movement disorders such as Parkinson's disease can have a profound effect on the voice, producing a weak monotone voice that is difficult to understand because of its low volume and lack of articulation.

Spasmodic dysphonia is a neurologic condition known as vocal stuttering. It produces a strangulated voice that can be associated with facial tics and grimaces. Many times this disorder is caused by hyperfunctioning of the vocal folds, making them close abnormally tight and not allowing the normal flow of air to pass through them to produce a smooth voice. By temporarily paralyzing one of the hyperfunctioning vocal folds with an injection containing botulinum toxin, many of these patients are able to resume full vocal functioning.

Aging is another factor that can result in significant hoarseness. A generalized loss of muscle tone can lead to a decrease in both abdominal and laryngeal musculature effort. Our mucous secretions thicken, hormone levels vary, laryngeal cartilages ossify, and joints can become arthritic. Rheumatoid arthritis can affect vocal quality in younger individuals as well. Chronic cardiac or pulmonary disease will result in a reduced respiratory capacity leading to a decrease in volume and abnormal vocal fold motion. The vocal folds move too slowly and produce a voice that has an abnormally low pitch, called glottic fry. Patients who have

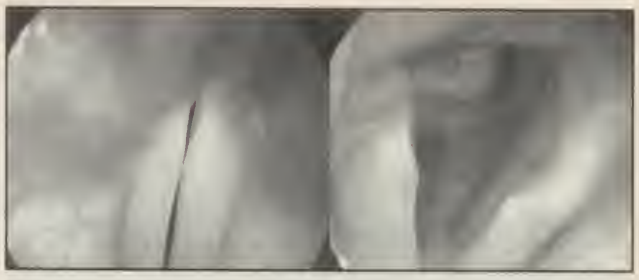

FIGURE 1. A larynx in phonation (L) and in inspiration (R). During phonation there is a small persistent, mild glottic chink, allowing for escape of air leading to a very breathy voice. On inspiration, there is abduction of the left true vocal fold and relative fixation of the right true vocal fold. This is secondary to idiopathic paresis of the right hemilarynx leading to a hoarse and breathy voice. Notice the asymmetry of the vocal folds during inspiration due to the lack of abduction of the right true vocal fold.

respiratory dysfunction secondary to intrinsic pulmonary disease or neuromuscular disorders can have a hoarse voice because of inadequate ventilatory support to the vocal folds. Those patients requiring supplemental oxygen therapy may also develop hoarseness from the drying effect of the oxygen on the respiratory mucosa.

Asthmatics who use inhaled medications are prime candidates for hoarseness. Some of the medications that they use to treat their reactive airways can cause edema of the larynx or local thrush. Sometimes changing medications or changing the techniques that the patient uses to inhale these medications will reduce vocal fold swelling and dysfunction. The use of "spacers" has proven very helpful in maintaining good vocal quality in asthmatic patients.

Endocrine abnormalities can also produce significant hoarseness. Hypothyroidism can produce diffuse myxedema and treatment with thyroid medication will restore the voice to normal. Even in the face of low-normal thyroid function tests, the diagnosis of hypothyroidism should not be overlooked. Elevated thyroid-stimulating hormone levels, obesity, menstrual irregularities, and cold intolerance should heighten the practitioner's suspicions. A therapeutic trial of thyroid hormone replacement should be considered under these circumstances. Changes in hormone levels that occur in females during their menstrual cycle (laryngopathia prementrualis), pregnancy (laryngopathia gravidarum), and menopause can also produce significant episodes of vocal dysfunction and hoarseness. Rarely, patients with androgen-producing tumors (ovarian, adrenal, pituitary) may present with vocal complaints.

Anxiety, depression, substance abuse, and hypochondriasis are among the psychologic causes of persistent hoarseness. Cocaine abuse is particularly harmful because it causes marked vasoconstriction with rebound vasodilation of the respiratory mucosa. Cocaine use also interferes with fine motor control and can anesthetize the larynx, predisposing to

FIGURE 2. A 35-year-old female professional singer with significant hoarseness and loss of the upper register.

Videostroboscopic examination of the larynx shows moderate Reinke's edema of the true vocal folds with beginning anterior true vocal fold nodules. Her vocal pathology is being exacerbated by significant gastroesophageal reflux, as demonstrated by the erythema of the entire posterior glottis.

serious laryngeal injury. Speech therapists, voice trainers, and mental health professionals can help to restore the patient's ability to communicate clearly. Professional voice users are particularly vulnerable to these psychologic disorders because of the importance they place on their "instrument" in terms of their livelihood and psychologic wellbeing. It is incumbent on the physician not to dismiss their complaints without the appropriate medical evaluation. Reassurance and compassion are very comforting to these highly sensitive and artistic individuals.

Hoarseness can sometimes signal serious health problems as well. Many times it is an early warning sign of a tumor on the vocal folds or in the respiratory tract. Persistent sore throats, otalgia, dysphagia, and a hoarse or breathy voice are the hallmarks of an early laryngeal cancer. Early detection and treatment of laryngeal tumors can result in an over 90% five-year survival with good preservation of phonation. A tumor elsewhere in the body that can affect the laryngeal nerves can also produce significant hoarseness by not allowing full vocal cord motion. The chronically irritating effects of smoking and alcohol predispose these patients to chronic laryngitis, leukoplakia, and laryngeal cancer.

Hoarseness can sometimes be associated with medical emergencies as well. Stridor, especially in children, should signal a dangerous situation necessitating immediate medical evaluation. The laryngeal circumference in a child is much smaller than that of an adult. Even a small degree of submucosal hemorrhage and edema can precipitate life-threatening airway compromise. Hoarseness that occurs after a person gets hit in the neck, as in a sports injury or car accident, should also be considered a medical emergency. Even without the signs of significant external injuries, a laryngeal hematoma may lead to imminent airway compromise. Immediate evaluation by medical personnel is a must.

A new technical innovation to aid the otolaryngologist in the diagnosis of laryngeal pathology and dysfunction is called videostroboscopy. Stroboscopy involves the use of intermittent light activated by the action of the vocal folds. The acoustic signal is sent from the patient and processed through a computer with a unique light source that enables the physician to view the vocal folds in slow motion and with magnification. This sophisticated illumination tool allows the physician to study details of vibratory motion of the vocal folds that cannot be appreciated otherwise. From a paucity of findings for many patients with abnormal voice, stroboscopy provides new visual data and opens a new world of understanding for voice health professionals. It allows us to have a better understanding of the physiology of the vocal mechanism as well as the results of medical, surgical, and voice therapy. It also allows us to make easier assessments in the detection of lesions that have been previously missed and evaluation of scarring on the vocal folds, stiffness of the vocal folds, and overall vocal hygiene.

With the use of videostroboscopy, voice specialists have been able to study extensively the laryngeal biomechanics of the normal and singing voice. A recent study indicates that patients with functional voice disorders (hoarseness or voice abnormalities without any obvious anatomic abnormalities) often demonstrate abnormal laryngeal biomechanics. These conditions are termed muscle tension dysphonias. It was found that female professional singers have the lowest muscle tension scores. Yet the highest muscle tension scores were seen in amateur female singers. Male singers, both professional and amateur, had intermediate muscle tension scores, and classical singers had lower muscle tension scores than nonclassical singers. The lowest muscle tension scores were seen in those singing choral music and the highest were seen in those singing jazz, pop, bluegrass, and gospel.

There are a variety of reasons why professional singers develop difficulties with their voice. Many times they stay up late at night and eat right before going to bed. This can lead to reflux of acid contents onto the larynx and cause chronic irritation. They are also often exposed to a smoky environment that leads to inflammation of the larynx. Trying to sing above loud music will also produce strain and dysfunction. This can lead to singer's nodules, tiny calluslike formations on the vocal folds that can end a singer's career if left untreated.

It is important to remember that hoarseness that lasts more than two weeks should not be attributed to a cold, poor eating

FIGURE 3. Vocal fold nodules in a 35-year-old vocalist.

Speech therapy, voice lessons, and the avoidance of airway irritants are the mainstays of treatment for this condition. Delay of treatment can lead to the end of a singer's career.

habits, or fatigue. Careful history and examination will usually lead to a prompt diagnosis and early initiation of treatment. Persistent hoarseness is usually beyond the scope and expertise of most primary care physicians and patients should be referred to a laryngologist specializing in the management of voice disorders. It is important that health care providers emphasize good vocal hygiene and teach patients not to neglect the most valuable source of human communication—the voice.

Ten tips to a good voice

Share the following ten tips with your patients to help them develop and maintain a good voice.

1. Try your best to maintain good general health. Get adequate rest to minimize fatigue. Exercise regularly and eat a balanced diet.
2. Maintain body hydration. It is very important to drink plenty of liquids. Caffeinated and alcoholic drinks pull water out of your system and deplete the vocal folds of their needed hydration. Airplanes are extremely dry environments. It is recommended that you drink at least eight ounces of nonalcoholic liquids per hour while flying.
3. Avoid throat clearing. Throat clearing because of excessive mucous or out of habit is traumatic to the vocal folds and should be eliminated as much as possible. Try swallowing instead or taking small sips of water or clear your throat silently with air only.
4. Avoid self-destructive behavior. Tobacco, marijuana, and cocaine are irritants to the vocal tract. Smoking is a potential disaster for the serious voice user.
5. Control acid reflux. Avoid eating for at least two to three hours before going to sleep. Elevate the head of your bed and use over-the-counter antacids as needed. Stronger medications may be necessary should your hoarseness persist.
6. Avoid certain drugs. Antihistamines tend to cause too much dryness of the upper respiratory tract and this leads to persistent hoarseness. Avoid aspirins and ibuprofen because they may predispose to bleeding. Chronic Coumadin therapy may also produce focal bleeding areas of the vocal folds producing a hoarse voice. Avoid use of local anesthetic over-the-counter preparations such as Cepacol lozenges and Chloraseptic spray. Voice professionals are known to say "Singing under the influence of a local anesthetic is like trying to play the piano with gloves on." Birth control pills that have a high content of progesterone can cause loss of the upper vocal range in the female larynx. Check with your physician to see if a substitute can be used.
7. Learn to use your voice with as little effort and tension as possible. Less is more when we think of vocal longevity. Reduce general voice use before a speaking engagement or performance. Think conservation. Avoid shouting, screaming, loud laughter, or throat clearing. Clap your hands or whistle to get the listener's attention.
8. Avoid talking in noisy environments. Try not to make strange vocal noises and sounds. Do not whisper. Whispering is worse than speaking!
9. Use good abdominal and diaphragmatic breathing and support. Speak at a normal rate of speed and pause in the middle of sentences to breathe again. Always do vocal warm-ups before singing or using the voice in strenuous ways.
10. Avoid speaking or singing near the extremes of your own vocal range. Try to maintain a smooth legato speech pattern with clear articulation.

Bibliography

Boon DR. *Is your voice telling on you?* San Diego: Singular Publishing Group, Inc., 1997.

Cohn JR, Spiegel JR, Sataloff RT. Vocal disorders and the professional voice: the allergist's role. *Ann Allergy Asthma Immunol* 1995;74:363–373.

Fairbanks DN. *Pocket Guide to Antimicrobial Therapy in Otolaryngology-Head and Neck Surgery,* 8th ed. American Academy of Otolaryngology Head and Neck Surgery Foundation Inc., 1996.

Koufman JA, Radomski TA, Joharji GM, et al. Laryngeal biomechanics of the singing voice. *Otolaryngol Head Neck Surg* 1996;115:527–537.

Sataloff RT. Common problems in professional singers. *Curr Therapies Otolaryngol Head Neck Surg* 1990;4:348–353.

Sataloff RT. The human voice. *Sci Am* 1992;267:108–115.

Sataloff RT, Speigel JR, Hawkshaw MJ. Strobovideolaryngoscopy: results and clinical value. *Ann Otol Rhinol Laryngol* 1991;100:725–727.

Von Leden H. Voice problems in entertainers. *West J Med* 1986;144:99–101. ■

Treatment of persistent *Pfiesteria*-human illness syndrome

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ABSTRACT: *Patients with exposure to* Pfiesteria *toxin have developed an illness,* Pfiesteria*-human illness syndrome, characterized by skin lesions, headache, myalgias, conjunctival irritation, bronchospasm, abdominal pain, secretory diarrhea, recent memory loss, and difficulties with number sequencing. Not all patients demonstrated all features of the syndrome. The natural history of* Pfiesteria*-human illness syndrome shows that most patients' symptoms improve without treatment. This article reports the improvement of symptoms that had persisted for over one month in five patients, which the author attributes to treatment with cholestyramine. These patients were self-referred to the Pocomoke River Rash and Associated Illness Center, a clinic that opened on August 6, 1997, in response to the need for a central facility for diagnosis of human illness acquired from* Pfiesteria.

Until the Pfiesteria *toxin(s) is isolated and characterized, and laboratory diagnostic tests are available, physicians must be able to recognize* Pfiesteria*-human illness syndrome and intervene when symptoms, particularly memory loss and diarrhea, cause significant impairment in daily activities.*

There are no precedents for the treatment of Pfiesteria *or any dinoflagellate toxin-related human illness reported in the literature. The successful use of cholestyramine reported here may provide a model for understanding dinoflagellate toxin physiology in the human body. This paper reports an uncontrolled observational study. When identification of the toxin is completed, a basis for properly controlled studies will be available.*

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Treatment of human illness caused by *Pfiesteria* toxin, *Pfiesteria*-human illness syndrome (PHIS), has not been reported in the medical literature. The diagnosis of acute human illness acquired from exposure to *Pfiesteria* toxin in the wild has only been made[1] and confirmed recently.[2] Acquisition of human illness from intensive laboratory exposure to *Pfiesteria* was reported by JoAnn Burkholder at North Carolina State University in 1995.[3] Since the initial reports of PHIS acquired in the wild, the Pocomoke River Rash and Associated Illness Center, a clinic affiliated with the Edward McCready Hospital in Crisfield, Maryland, has evaluated nearly 50 patients with acute, recurrent, and chronic exposure syndromes. For this report, symptoms lasting longer than four weeks, with or without recurrent exposure to *Pfiesteria*-inhabited water, are considered persistent.

A cohort of five patients with a clinical diagnosis of persistent PHIS were treated in a nonrandomized, uncontrolled manner. The marked clinical improvement in these patients within two weeks prompted this preliminary report. Confirmation by properly controlled scientific studies is not likely to be forthcoming until the toxin of *Pfiesteria* is identified.

The Pocomoke River, located at the lower portion of the Eastern Shore of Maryland, is a tributary of the Chesapeake Bay. Beginning in October 1996, commercial fishermen working on the Pocomoke River began experiencing new symptoms of recurrent conjunctival irritation, unusual skin rashes, recurrent cough, loss of recent memory, headache, crampy abdominal pain, and watery diarrhea. These symptoms coincided with the netting of fish with necrotic lesions. Although menhaden were the most commonly affected species, all species of fish were affected. The lesions were similar to those noted from other waters, including the Neuse River in North Carolina, with low levels of *Pfiesteria* toxin-forming zoospores. Not all the fishermen were sickened; most had several but not all of the illness symptoms. No deaths occurred.

Similar symptoms developed acutely in three patients with brief exposure to the river (i.e., water skiing, swimming) one week before a major fish kill on August 6, 1997. Four cases of PHIS were found in Maryland Department of Environment employees who were working in the water during an active fish kill. On August 19, the State Department of Health organized a multidisciplinary team of university physicians to examine a group of 13 patients with symptoms on August 19.

Consistent abnormalities on neurocognitive testing similar to those seen in at least one of the North Carolina State University laboratory workers were found. Positron emission tomography scans done on five of the identified patients showed global reduction in glucose uptake. Maryland acknowledged the human health risks from *Pfiesteria*, in part based on the severity of the neurocognitive impairment that was not obvious on clinical examination. The political and economic consequences of Maryland's actions were magnified partly because no effective treatment strategies were available other than closure to public use of selected rivers by the state. The public avoidance of seafood consumption was in part due to the fear of contracting an untreatable illness.

The use of cholestyramine as a treatment for persistent PHIS was developed by the author after his repeated observation that persons who had an acute PHIS syndrome with secretory diarrhea that was successfully treated with cholestyramine also had a concurrent improvement in headache, memory loss, rash, and cough. Treatment lasted two weeks, continuing longer for those who had recurrent exposures. All patients were given one teaspoon of Milk of Magnesia upon arising, and one scoop of cholestyramine mixed in juice four times a day.

Case 1

A 56-year-old female Maryland Department of Environment worker was on a boat sorting lesioned fish from nonlesioned fish during an active fish kill on August 7, 1997. She had an abrupt onset of conjunctival irritation, cough, headache, wheezing, and a burning sensation on her exposed skin. The skin subsequently vesiculated and desquamated. Because of memory impairment she was referred by the author to Donald Schmechel, M.D., at Duke University on August 18. Neurocognitive studies were markedly abnormal. Treatment of nasal congestion and bronchospasm with inhaled steroids and bronchodilators improved symptoms minimally. Pulmonary function testing showed forced vital capacity and forced expiratory volume in one second each reduced to 50% of predicted. Memory loss continued.

Treatment of one scoop of cholestyramine with one ounce of 70% sorbitol (to prevent constipation), four times per day was begun on September 17, 1997. By October 3, pulmonary function testing improved forced vital capacity to 98% predicted and forced expiratory volume in one second to 70% predicted, with nearly full restoration of memory.

Case 2

A 47-year-old male fisherman had recurrent episodes of conjunctival irritation, cough, wheeze, headache, memory loss, and severe abdominal cramping beginning in October 1996. He stopped work on the river in May 1997 with improvement in eye and lung symptoms. His memory loss and cramping persisted. He returned to the river on August 11, 1997, assisting the Maryland Department of Natural Resources in investigating and monitoring fish kills in many adjacent waterways. His symptoms recurred promptly. Treatment with cholestyramine, one scoop four times a day, was begun on August 30. By September 6, his symptoms had abated markedly. The patient returned to work in *Pfiesteria*-inhabited waters and his symptoms returned.

Case 3

A 33-year-old male waterman was healthy until October 1996, when he developed abdominal cramps, watery diarrhea with occasional incontinence, chronic cough, a 40 lb weight loss, and headaches. He was treated for pneumonia six separate times between October 1996 and July 1997. Memory impairment was

documented on neurocognitive examinations and a positron emission tomography scan was abnormal.

The patient was treated with inhaled steroids, bronchodilators, and clarithromycin with cessation of diarrhea and improvement in lung symptoms about the time of the river closure. Memory loss continued. With re-exposure to the river his respiratory symptoms and diarrhea recurred.

Cholestyramine and sorbitol treatment was begun September 7, 1997. Despite continued river exposure, a follow-up examination on October 2 revealed his memory loss to be dramatically improved. He continued on low-dose cholestyramine with a multiple vitamin. He uses bronchodilators rarely, as needed. A subsequent neurocognitive examination showed improvement.

Case 4

A 32-year-old commercial diver had extensive wet suit exposure to water on the Wicomico Creek later, shown to have *Pfiesteria*. He had gradual onset of cramps, diarrhea, skin lesions, headache, and memory loss beginning in July 1997.

Treatment with cholestyramine and sorbitol was begun on September 25, 1997. Neurocognitive examinations done the next day were markedly abnormal. The patient had symptomatic improvement within three days. He stated that he could tell when the dose of cholestyramine was "wearing off" by recurrence of abdominal cramping. At follow-up two weeks later, the patient was asymptomatic and had returned to work. Subsequent neurocognitive examination showed minimal improvement only. The patient continues to work in the area waters. He continues to use two scoops of cholestyramine daily.

Case 5

A 44-year-old male Virginia Marine Fisheries worker had extensive exposure to the Pocomoke River beginning in July 1997. Coworkers, including Maryland Department of Natural Resources commander, noted impairment in the patient's memory. He also had abdominal cramps and skin lesions. The patient was referred for treatment by the patient described in Case 2. Memory loss was documented by an inability to remember a five-number sequence (0/5) and a four word list (1/4).

Treatment was initiated on September 25, 1997, with fading of skin lesions, improvement in memory, and elimination of abdominal pain by October 3.

Discussion

As our knowledge of PHIS expands, laboratory markers for the illness should become available. Neurocognitive testing, the fingerprint of the illness, is expensive and not readily available, however, a clinical diagnosis of PHIS can be made. Although the illness can be self-limited, the persistent symptoms of these five patients improved rapidly with cholestyramine treatment.

Studies of brevetoxin, a different dinoflagellate toxin, in rats[4] show prompt clearing with an IV dose, within 24 seconds, with uptake by muscle, metabolism by the liver, with excretion into the intestine. Sherwood Hall, from the Food and Drug Administration, Shellfish Poisoning, and Mark Poli, a brevetoxin expert, have endorsed continuing work with cholestyramine (S. Hall, M. Poli, personal communications).

Table 1. *Pfiesteria* symptom complex

Immediate effects	Within 24 hours
Skin burning	Rash
Conjunctival injection	Headache
Cough	Abdominal cramps
Wheeze	Exercise-induced asthma
Sore throat	
Within 3 hours	**Persistent**
Myalgia	Rash up to 2 months
Headache	Memory loss of up to 6 months
Memory impairment	Neurocognitive deficits (unknown duration)
	Bronchospasm
	Secretory diarrhea

The hypothesis for consideration is that the *Pfiesteria* toxin causes an acute human illness and, in some patients, a persistent human illness. The toxin, a nonspecific irritant of skin and mucous membranes, passes quickly from alveoli into blood following aerosol or droplet inhalation. The toxin is postulated to be absorbed into muscle, with equilibration into lipid tissues such as brain and surfactant in lung. The toxin is excreted into bile with enterohepatic recirculation.

Cholestyramine may bind toxin in the small intestine, permitting excretion in stool, depleting the toxin from lipid reservoirs. The clinical symptoms fit such a proposed model (**Table 1**), with conjunctival irritation and cough being early onset symptoms, followed by myalgias, headache, and memory loss. Bronchospasm and abdominal symptoms are late manifestations.

Recurrence of symptoms with repeat exposure suggests a lack of protective immune response to the toxin. Although cholestyramine is not a totally benign treatment, the resolution of headache, memory impairment, and bronchospasm suggests strongly that treatment of the gastrointestinal tract affords an opportunity to reduce the body burden of toxin.

The prompt improvement in persistent symptoms with use of cholestyramine may provide a therapeutic option for the practicing physician faced with the clinical problem of profound memory impairment and disruption of normal daily life that *Pfiesteria* can cause.

References

1. Shoemaker R. Diagnosis of *Pfiesteria*–human illness syndrome. *Md Med J* 1997;46:521–523.
2. Grattan L., et al. *Lancet* in press
3. Glasgow HB, Jr, Burkholder JM, Schmechel, et al. Insidious effects of a toxic estuarine dinoflagellate on fish survival and human health. J Toxicol Environ Health 1995;46:501–522.
4. Poli MA, Templeton CB, Thompson WL, Hewetson JF. Distribution and elimination of brevetoxin PbTx-3 in rats. *Toxicon* 1990;28:903–910. ■

Treatment of congestive heart failure with beta-adrenergic blockers: a brief review of literature

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ABSTRACT: *The importance of the adrenergic nervous system in support of hemodynamics in patients with congestive heart failure has been known for a long time. Thus, when beneficial effects of beta-blocker therapy in patients with resistant congestive heart failure were reported more than two decades ago, such an approach was deemed counterintuitive. Despite the skepticism, numerous reports, including well-planned, randomized studies, confirmed the beneficial effects of various beta-blockers on congestive heart failure. Recently, a new generation of beta-blocker, carvedilol (Coreg), which combines nonselective beta-blocking and vasodilating properties, was cleared by the U.S. Food and Drug Administration for the treatment of congestive heart failure. This article is a brief historical review of the literature regarding the use of beta-blockers for the treatment of congestive heart failure.*

Traditionally, beta-blockers were considered a contraindication in patients with congestive heart failure (CHF) because of their negative inotropic property. Thus, it was not surprising that when beneficial effects of beta-blocker therapy were reported in patients with CHF more than two decades ago[1,2] there was a great deal of controversy and skepticism. However, experience has validated the concept initially regarded as unfounded.

Recently, a newer generation of beta-blocker, carvedilol, which combines nonselective beta-blocking and vasodilating properties, was approved for the treatment of CHF.[3]

Early studies

In the 1970s, Lee[1] and Waagstein et al[2] independently employed beta-blockers to treat resistant CHF. In 1972, Lee[1] treated a 72-year-old man at the University of Maryland Hospital. The patient had a long-standing history of hypertension and developed severe CHF and persistent sinus tachycardia resistant to digitalis, diuretics, and bed rest. At the time, it was postulated that low doses of propranolol might reduce the cardiac rate without impairing cardiac contractility, and thereby reduce the cardiac work load. Accordingly, 10 mg of propranolol was given orally every six hours, and remarkable improvement of CHF was observed. Seven additional patients with resistant CHF and tachycardia due to various etiologies were treated with low doses of propranolol. There was symptomatic improvement in six patients. In an 82-year-old patient who was considered terminal, the cardiac rate decreased from 130 to 90/min 30 hours after propranolol was initiated. However, she died of cardiogenic shock two days later. The results of this experience were reported briefly in the proceedings of an international symposium of beta-adrenergic blockade in 1978.[1]

Before this report, Waagstein et al[2] published beneficial effects of beta-blockers in patients with dilated cardiomyopathy in 1975. Their first patient was treated with alprenolol in 1973, and an additional six patients received practolol. All of these patients had resting tachycardia. Four patients noticed immediate reduction of dyspnea and retrosternal oppression. Three patients reported gradual improvement one month after the addition of beta-blocker treatment. Subsequently, several groups of investigators[4-6] reported negative results of beta-blocker treatment in patients with CHF. Rapid administration of excessive doses of drugs and/or employing drugs with intrinsic sympathomimetic activity were the most likely causes of their negative trials.

Recent studies

More recently, numerous reports have confirmed the beneficial effects of various types of beta-blockers on CHF[7-29] compared with placebo, although the results of these studies were by no means unanimous. Most enrolled patients had CHF due to either ischemic or idiopathic dilated cardiomyopathy with left ventricular ejection fraction (LVEF) ≤ 0.35. The beneficial effects include symptomatic improvement and overall functional class as evaluated by changes in the New York Heart Association (NYHA) functional class. There was modest increase in LVEF and stroke volume index, but cardiac index did not change significantly, reflecting the decreased heart rate by beta-blocker therapy. Pulmonary artery and pulmonary capillary wedge pressures were decreased toward normal. Maximal exercise duration and peak oxygen consumption did not improve, but there was a significant decrease in maximal exercise heart rate and rate-pressure product in patients receiving beta-blocker therapy at levels of exercise comparable with the placebo group in most studies. Some investigators reported a greater increase in exercise duration,[18] and submaximal exercise duration tended to increase, but the magnitude of the change was small compared with the placebo group.[21] Ambulatory electrocardiogram monitoring revealed a tendency for a reduction in the total number of ventricular premature beats and the number of runs of ventricular tachycardia; however, the changes were not statistically significant.[20] There was more than 50% reduction in the number of hospital admissions[18,27] related to exacerbation of CHF, and reduced clinical progression in mildly symptomatic, well-compensated CHF.[26] Most of the trials were too small to evaluate the effect on mortality in patients treated with beta-blockers.

In the U.S. carvedilol heart failure study,[24] the overall mortality rate was 7.8% in the placebo group and 3.2% in the carvedilol group; the reduction in risk attributable to carvedilol was 65% (95% confidence interval, 39– 80; $P < 0.001$). On the other hand, in the Australia-New Zealand carvedilol heart failure study,[29] death and total hospitalizations were reduced by only 25%. The reasons for the disparate results of the studies are not clear. In the beta-blocker heart attack trial, propranolol decreased the occurrence of sudden death by 47% in patients with prior CHF compared with 13% in patients without CHF.[10] Decrease in the risk of sudden death was also reported in the carvedilol trial.[24] It has been suggested that trials of several thousand patients with several years follow-up are required to investigate the effect of beta-blockers on survival of patients with CHF.

Some investigators stated that beta-blockers may be less beneficial in CHF associated with coronary artery disease than in patients with idiopathic dilated cardiomyopathy, presumably because of the relatively larger fibrosis in the former than the latter.[15] However, Fisher et al.[18] stated that definite symptomatic and functional improvement is common in CHF associated with coronary artery disease after metoprolol treatment. Packer et al.[24] also stated that reduction in mortality due to carvedilol was similar regardless of the cause of the heart failure.

Possible mechanisms of beneficial effects

Several hypotheses have been proposed to explain the beneficial effect of the beta-blockers in CHF.

1. Although activation of the sympathetic system with increase in plasma catecholamine may be helpful in maintaining hemodynamics in the early stage of CHF,[30] chronic activation of the sympathetic system has been shown to be deleterious to the heart by direct injury or increasing metabolic demand on the already energy starved myocardium.[31] Likewise, treatment of CHF with inotropic agents promptly improves hemodynamic abnormalities and functional status; however, the long-term result is disappointing because of increased mortality.[32] Beta-blockers may shield the myocardium from sustained toxic catecholamine stimulation.
2. A subgroup of patients with CHF may have persistent tachycardia despite vigorous treatment. Tachycardia not only increases energy expenditure but also compromises ventricular filling and coronary blood flow by shortening diastole. Evidence has been accumulated that chronic uncontrolled tachycardia may result in reversible left ventricular dysfunction.[33] The negative chronotropic effect of beta-blockade may be important for these patients with tachycardia. Bennet et al.[34] reported that a resting heart rate $\leq$ 85/min. or exercise heart rate $\leq$ 130/min identified patients with low frequency of increase of ejection fraction following metoprolol therapy in ischemic cardiomyopathy. They stated that the heart rate is more closely linked to metoprolol response to CHF than plasma norepinephrine. Koide et al.[35] reported that bradycardia plays an important role in the beta-blocker–induced improvement in contractile dysfunction of experimental chronic mitral regurgitation. When bradycardia was prevented by the insertion of an atrial pacemaker, beta-blocker treatment failed to improve contractile dysfunction.

   However, Packer et al.[24] stated that the reduction in mortality due to carvedilol was similar regardless of resting heart rate. It is possible that beta-blockers may prevent excessive ambulatory heart rate among patients without resting tachycardia.
3. Beta-receptors are up-regulated after beta-blocker therapy, thus it was speculated that beta-blockers may render myocardial cells more responsive to inotropic support from catecholamine.[11] However, this hypothesis fails to explain the coexistence of improved myocardial function and decreased heart rate.[13] Furthermore, increase in beta-receptor density does not correlate with clinical or hemodynamic improvement in patients with CHF,[12] and carvedilol does not increase the cardiac beta-receptor density.[28]

Carvedilol compared with the other beta-blockers

Although carvedilol is the only beta-blocker currently approved for the treatment of CHF, other drugs, such as bucindelol[13–15,17] and metoprolol,[9,11,18,19] are also widely reported to be beneficial. Most of the patients who were given beta-blockers for CHF are already treated with angiotensin-converting enzyme (ACE) inhibitors or other vasodilators. Therefore, the reported superiority of carvedilol over other beta-blockers,[28] such as metoprolol, cannot be explained on the basis of the additional vasodilating effect of carvedilol alone. Unlike metoprolol, carvedilol does not increase cardiac beta-receptor density and selectively lowers coronary sinus norepinephrine levels.[28] In addition, carvedilol was reported to possess an antioxidant effect and prevent cardiac ischemic damage and apoptosis in rabbit cardiomyocytes.[36] The combination of these effects may account for the differences in the clinical results between carvedilol and metoprolol. Further studies are needed to confirm these findings.

Patient selection

According to the prescribing information,[3] carvedilol is indicated for the treatment of mild or moderate CHF (NYHA class 2 or 3) of ischemic or cardiomyopathic origin, in conjunction with digitalis, diuretics, and ACE inhibitors. It is contraindicated in patients with NYHA class 4 decompensated CHF requiring intravenous inotropic therapy. All other known contraindications to beta-blocker therapy apply.

Dosage and administration

The recommended starting dose of carvedilol is 3.125 mg twice daily for two weeks. If this dose is tolerated, it can be increased to 6.25 mg twice daily. Dosing should then be doubled every two weeks if tolerated. The maximum recommended dose is 25 mg twice daily in patients weighing less than 85 kg and 50 mg twice daily in patients weighing more than 85 kg. Compared with the placebo group, the carvedilol-treated group had the following higher frequencies of adverse reactions:

1. Up-titration phase: dizziness (21.8% vs. 7.6%), fatigue (17.3% vs. 8.3%), heart failure (6.8% vs. 4.1%), hypotension (6.8% vs. 2.1%), bradycardia (3.0% vs. 0.0%).[25]
2. Maintenance phase: dizziness (24.0% vs. 11.5%), fatigue (17.1% vs 13.7%), hypotension (6.2% vs. 2.2%) syncope (4.7% vs. 2.2%), bradycardia (5.4% vs. 0.7%).[25]

Additional adverse reactions to carvedilol include diarrhea (11.8% vs. 5.9%), nausea (8.5% vs. 4.8%), vomiting (6.3% vs. 4.3%), thrombocytopenia (2.0% vs. 0.5%),

hypertriglycemia (12.2% vs. 7.8%), hypercholesterolemia (4.1% vs. 2.5%), and abnormal vision (5.0% vs. 1.8%).[3] In subjects with mild to moderate CHF from systolic dysfunction, carvedilol produced dose-related reduction in mortality and hospitalization rate.[27] It has been reported that the addition of an initial low dose of bucindolol[17] or metoprolol[18] to optimize standard therapy caused no serious adverse reactions, and the patients are generally well tolerated to careful up-titration. However, each patient must be individualized and closely monitored. If the resting heart rates are reduced to approximately 65 beats per minute without excessive ambulatory heart rates and there is a symptomatic improvement, it may not be necessary to increase the drug to the target doses. This approach may lessen the potential serious adverse effects.

Conclusion

In conclusion, although there remain some unanswered questions, beta-blockers appear to be an important adjunct in properly treating selected patients with CHF of ischemic or cardiomyopathic origin. It can ameliorate symptoms, improve left ventricular function and overall NYHA functional class, and reduce the risk of hospitalization.

Currently, the only beta-blocker approved for the treatment of CHF is carvedilol, which has been reported to reduce the risk of death and inhibit progression in patients with mild symptoms of CHF despite standard treatment for a least two months. It appears reasonable to add beta-blockers to the standard treatment in the early rather than the late stage of CHF with symptoms.

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References

1. Lee YC. Low dose propranolol in resistant congestive heart failure with tachycardia (Discussion). In: Braunwald E (ed). Beta-adrenergic blockade, a new era in cardiovascular medicine. Proceedings of an international symposium. Amsterdam: *Excerpta Medica* 1978;72.
2. Waagstein F, Hjalmarson A, Varnauskas E, Wallentin I. Effect of chronic beta-adrenergic receptor blockade in congestive cardiomyopathy. *Br Heart J* 1975;37:1022–1036.
3. Coreg prescribing information. Smith Kline Beecham Pharmaceuticals.
4. Ikram H, Chan W, Bennett SI, Bones PJ. Hemodynamic effects of acute beta-adrenergic receptor blockade in congestive cardiomyopathy. *Br Heart J* 1979;42:311–315.
5. Currie PJ, Kelly MJ, McKenzie A, et al. Oral beta-adrenergic blockade with metoprolol in chronic severe dilated cardiomyopathy. *J Am Coll Cardiol* 1984;3:203–209.
6. Binkley PF, Lewe RF, Lima JJ, et al. Hemodynamic-inotropic response to beta-blocker with intrinsic sympathomimetic activity in patients with congestive cardiomyopathy. *Circulation* 1986;74:1390–1398.
7. Anderson JL, Lutz JR, Gilbert EM, et al. A randomized trial of low-dose beta-blockade therapy for idiopathic dilated cardiomyopathy. *Am J Cardiol* 1985;55:471–475.
8. Swedberg K, Hjalmarson A, Waagstein F, Wallentin I. Preliminary communication: prolongation of survival in congestive cardiomyopathy by beta-receptor blockade. *Lancet* 1979;1:1374–1376.
9. Engelmeier RS, O'Connell JB, Walsh R, et al. Improvement in symptoms and exercise tolerance by metoprolol in patients with dilated cardiomyopathy: a double-blind, randomized, placebo-controlled trial. *Circulation* 1985;72:536–546.
10. Chadda K, Goldstein S, Byington R, Curb JD. Effect of propranolol after acute myocardial infarction in patients with congestive heart failure. *Circulation* 1986;73:503–510.
11. Heilbrunn SM, Shah P, Bristow MR. Increased beta-receptor density and improved hemodynamic response to catecholamine stimulation during long-term metoprolol therapy in heart failure from dilated cardiomyopathy. *Circulation* 1989;79:483–490.
12. Packer M. Pathophysiological mechanisms underlying the effects of beta-adrenergic agonists and antagonists on functional capacity and survival in chronic heart failure. *Circulation* 1990;82(2 suppl):I–77–88.
13. Eichhorn EJ, Bedotto JB, Malloy CR, et al. Effects of beta-adrenergic blockade on myocardial function and energetic in congestive heart failure. Improvement in hemodynamic, contractile, and diastolic performance with bucindolol. *Circulation* 1990;82:473–483.
14. Anderson JL, Gilbert EM, O'Connell JB, et al. Long term (2 year) beneficial effects of beta-adrenergic blockade with bucindolol in patients with idiopathic dilated cardiomyopathy. *J Am Coll Cardiol* 1991;17:1373–1381.
15. Woodley SL, Gilbert EM, Anderson JL, et al. Beta-blockade with bucindolol in heart failure due to ischemic vs. idiopathic dilated cardiomyopathy. *Circulation* 1991;84:2426–2441.
16. Das Gupta P, Broadhurst P, Raftery EB, Lahirir A. Value of carvedilol in congestive heart failure secondary to coronary heart disease. *Am J Cardiol* 1990;66:1118–1123.
17. Eichhorn EJ. Effect of bucindolol in heart failure. *Am J Cardiol* 1993;71:65C–70C.
18. Fisher ML, Gottlieb SS, Plotnick GD, et al. Beneficial effects of metoprolol in heart failure associated with coronary artery disease: a randomized trial. *J Am Coll Cardiol* 1994;23:943–950.
19. Eichhorn EJ, Heesch CM, Barnett JH, et al. Effect of metoprolol on myocardial function and energetics in patients with nonischemic dilated cardiomyopathy: a randomized, double-blind, placebo-controlled study. *J Am Coll Cardiol* 1994;24:1310–1320.
20. Olsen SL, Gilbert EM, Renlund DG, et al. Carvedilol improves left ventricular function and symptoms in chronic heart failure: a double-blind randomized study. *J Am Coll Cardiol* 1995;25:1225–1231.

21. Krum H, Sachner-Bernstein JD, Goldsmith RL, et al. Double-blind, placebo-controlled study of the long term efficacy of carvedilol in patients with severe chronic heart failure. *Circulation* 1995;92:1499–1506.
22. Anderson B, Caidahl K, DiLenarda A, et al. Changes in early and late filling patterns induced by long-term adrenergic beta-blockade in patients with idiopathic dilated cardiomyopathy. *Circulation* 1996;94:673–682.
23. Quaife RA, Gilbert EM, Christian PE, et al. Effects of carvedilol on systolic and diastolic left ventricular performance in idiopathic dilated cardiomyopathy or ischemic cardiomyopathy. *Am J Cardiol* 1996;78:779–784.
24. Packer M, Bristow MR, Cohn JN, et al., for the U.S. carvedilol heart failure study group. The effect of carvedilol on morbidity and mortality in patients with chronic heart failure. *N Engl J Med* 1996;334:1349–1355.
25. Packer M, Colucci WS, Sackner-Bernstei JD, et al. Double-blind controlled study of the effects of carvedilol in patients with moderate to severe heart failure: the precise trial. *Circulation* 1996;94:2793–2799.
26. Colucci WS, Packer M, Bristow MR, et al. Carvedilol inhibits clinical progression in patients with mild symptoms of heart failure. *Circulation* 1996;94:2800–2806.
27. Bristow MR, Gilbert EM, Abraham WT, et al. Carvedilol produces dose-related improvements in left ventricular function and survival in subjects with chronic heart failure. *Circulation* 1996;94:2807–2816.
28. Gilbert EM, Abraham WT, Olsen S, et al. Comparative hemodynamic, left ventricular functional, and antiadrenergic effects of chronic treatment with metoprolol versus carvedilol in the failing heart. *Circulation* 1996;94:2817–2825.
29. Australia/New Zealand Heart Failure Research Collaborative Group. Randomized, placebo-controlled trials of carvedilol in patients with congestive heart failure due to ischemic heart disease. *Lancet* 1997;349:375–380.
30. Gaffney TE, Braunwald E. Importance of adrenergic nervous system in support of circulatory function in patients with congestive heart failure. *Am J Med* 1963;34:320–324.
31. Haft JI. Cardiovascular injury indueed by sympathetic catecholamines. *Prog Cardiovasc Dis* 1974;17:73–85.
32. Packer M, Carver JR, Rodeheffer RJ, et al. Effects of oral milrinone on mortality in severe chronic heart failure. *N Engl J Med* 1991;325:1468–1475.
33. Shinbane JS, Wood MA, Jensen DN, et al. Tachycardia-induced cardiomyopathy: a review of animal models and clinical studies. *J Am Coll Cardiol* 1997;29:709–715.
34. Bennett SK, Fisher ML, Krichten C, et al. Ischemic cardiomyopathy treated with metoprolol: baseline heart rate predicts likelihood of increased ejection fraction (abstract). *Circulation* 1993;88:(suppl 4):I–104.
35. Koide M, Nagatsu M, Tagawa H, et al. Contribution of heart rate to the ameliorative effects of beta-blocker on contractile function in experimental chronic mitral regurgitation (abstract). *Circulation* 1994;90(suppl 4):I–542.
36. Yue TL, Ma XL, Chen XS, et al. Carvedilol prevents cardiac ischemic damage and apoptosis in rabbit cardiomyocytes. *Circulation* 1996;94(suppl 1):I–226. ■

WHAT TO CALL FOR

The Agency for Health Care Policy Research (AHCPR) is encouraging all physicians to help their patients quit smoking because research shows that smokers have the best chance of quitting when their health care providers get involved. To aid physicians in this intervention, AHCPR developed a Smoking Cessation Consumer Tools Kit, complete with four easy-to-read, black and white, reproducible, one-pagers that address particular concerns of smokers, especially those in challenging situations such as first time quitters, multiple quit smoking attempts, pregnancy and smoking, and smokers facing surgery.

A free copy of the Smoking Cessation Consumer Tools Kit can be obtained through the AHCPR Clearinghouse by calling 800-358-9295 or writing to Smoking Cessation, AHCPR Publications Clearinghouse, P.O. Box 8547, Silver Spring, MD 20907-8547. The tool kit can also be accessed on AHCPR's website at http://www.ahcpr.gov/ and on the Centers for Disease Control and Prevention's Office on Smoking and Health website at http://www.cdc.gov/tobacco.

Dietary controls produce positive results for a non–insulin-dependent diabetes mellitus patient

Lawrence I. Silverberg, D.O., and Simona Eng

ABSTRACT: *Renal disease is a leading cause of death and disability for diabetic patients. Diabetic nephropathy is responsible for half of the cases of end-stage renal disease in the United States. For non–insulin-dependent diabetes mellitus patients, the prevalence of diabetic nephropathy varies from 15% to 60% and is influenced by genetic background. Early screening and controlling of microalbumin levels are essential to affect the outcome of diabetic nephropathy. Studies show that clinical renal dysfunction in diabetics does not correlate well with the histological abnormalities. Strategies for nephropreservation include close lipid, glycemic, and blood pressure control, and tobacco termination. Use of angiotensin-converting enzyme inhibitors exert nephroprotective effects beyond their beneficial blood pressure-lowering effects. The importance of strict diet is emphasized in a case presentation.*

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Contrary to previous thoughts that diabetic nephropathy levels off after 25 years, there are data that suggest that nephropathy in non–insulin-dependent diabetes mellitus (NIDDM) patients actually increases over time to 75% after 35 years.[1,2] After years of research, microalbuminuria (30 to 300 mg/24 h.) is now accepted as a marker for renal disease in diabetics. Physicians should screen all diabetic patients by monitoring their microalbumin levels. Microalbuminuria results from an increased transglomerular flux, which increases the permeability of the glomerular capillaries because of increased capillary pressure. This results in the loss of negative charge on the basement membrane of the glomerulus.[3,4] Microalbuminuria represents an early phase of diabetic nephropathy that is initially found five to eight years before the onset of overt proteinuria or macroalbuminuria (>300 mg/24 h.).[5] Some experts now believe microalbuminuria is a stronger predictor of renal disease in insulin-dependent diabetes mellitus (IDDM) patients than in NIDDM patients. IDDM patients with microalbuminuria have a 20-fold increase of devel-

oping macroalbuminuria over a 10-year period, whereas NIDDM patients have a five-fold risk.[5] Microalbuminuria is a very strong predictor of cardiovascular disease in NIDDM patients, and utilizing screening techniques for it can impact patient morbidity and mortality.[4,5]

Dietary factors

Several studies of both NIDDM and IDDM patients suggest that restricting dietary protein may slow the rate of renal function decline and the rise of urinary albumin excretion.[1,4,6] Experts suggest that patients with early nephropathy, or even overt diabetic nephropathy, should maintain the recommended dietary allowance (RDA) for protein. The RDA of protein per kilogram of body weight is shown in **Table 1**.[1]

Although studies show that diabetics with microalbuminuria who restrict their dietary protein intake can reduce the albumin excretion rate, it is difficult for physicians to maintain patient compliance.[4,7] Several factors have been found to increase urinary albumin excretion, such as moderately strenuous exercise, hypertension, fever, urinary tract infections, and poor control of metabolism.[4,8] Preventive treatment consists of close glucose, lipid, and blood pressure control, tobacco cessation, and the use of angiotensin-converting enzyme (ACE) inhibitors.[6]

Allen et al[9] found that dietary salt restriction lowers blood pressure, glomerular filtration rate, and kidney weight in rats. The low-salt diet also lowered the levels of albumin in the urine of the rats. This research points to the benefits of dietary salt restriction in diabetic patients who are prone to renal dysfunction.

A case study of strict dietary control

The following case description is an example of the significant impact of strict diet on microalbuminuria. A 52-year-old, six foot, 254 pound male mathematician with a body mass index (BMI) of 34 (N=<29) was first seen by his family physician for tingling in his fingers and hands. A nonsmoker, he was also normotensive. After an extensive workup, which included a nerve conduction study, his glucose levels were found to be abnormal (fasting glucose was 295 mg/dl). Mild acute and chronic denervation of his distal median nerves was found. One week later, his microalbuminuria was 330 mg/24 h. (N=2–21 mg/24 h.). His C-peptide was 1.7 ng/ml (N=0.8–4.0ng/ml.). A low-fat, 1,800 calorie diet with moderate protein, a daily walking program of exercise, a sulfonylureic, and ACE inhibitor were started. Simple sugars were eliminated.

Because of the patient's highly structured personality, close monitoring of his blood sugars, exercise program, and nutritional program was possible. Two months later, his weight had dropped to 239 pounds with a BMI of 32. After the patient lost 15 pounds, his fasting morning blood sugars fell to 63 mg/dl and the sulfonylureic medication was successfully discontinued. His blood sugars from then on remained within the low to normal range. His weight five months later was 206 pounds with a BMI of 28; at this point, the ACE inhibitor was stopped. A physical examination revealed his weight had dropped to 197.5 pounds with a BMI of 26, a loss of almost 60 pounds in the six months since first being seen in June 1996. The patient's hemoglobin A1c was 5.3% (N=<6%) and his urinary microalbumin was 21 mg/24 h. (0.8–21). His average fasting blood sugars were in the range of 110 mg/nl, and he had none of the symptoms related to diabetes. The patient continues to be monitored.

Table 1. RDA of protein per kilogram of body weight

Children 7-14	1.0 g/d
Males 15-18	0.9 g/d
Males 18+	0.8 g/d
Females 15+	0.8 g/d
Pregnant women	10 g/d
Lactating women	15 + g/d

Conclusion

Research from The Diabetes Control and Complications Trial demonstrates that improving glycemic control can delay and prevent the progression of diabetic nephropathy.[5] Furthermore, by controlling blood pressure and using ACE inhibitors, the progression of albuminuria in diabetic patients can be slowed.[5] For now, screening all diabetic patients for microalbuminuria is the cornerstone in nephroprotection. ACE inhibitors, calcium channel blockers, strict glucose control, and modifications in risk factors define the state of the art.[8] Diabetic renal disease takes a heavy toll. It is a modifiable condition. This case study emphasizes how successful dietary modifications can be an important strategy for some diabetic patients.

References

1. Foster DF. Diabetes Mellitus. In Harrison's Principles of Internal Medicine. 13th edition. 1994.
2. Muller WA. Microalbuminuria in diabetes mellitus—illness or symptom? *Verischerungsmedizin* 1996;48:70–76.
3. Ravid M, Neumann L, Lishner M. Plasma lipids and the progression of nephropathy in diabetes mellitus type II: effect of ACE inhibitors. *Kidney Int* 1995;47:901–910.
4. Lloyd CE, Becker D, Ellis D, Orchard TJ. Incidence of complications in insulin-dependent diabetes mellitus: a survival analysis. *Am J Epidemiol* 1996;143:431–441.
5. Breyer JA. Medical management of nephropathy in type I diabetes mellitus: current recommendations. *J Am Soc Nephrol* 1995;6:1523–1529.
6. Bennett PH, Haffner S, Kasiske BL, et al. Screening and management of microalbuminuria in patients with diabetes mellitus: recommendations to the Scientific Advisory Board of the National Kidney Foundation from an ad hoc committee of the Council on Diabetes Mellitus of the National Kidney Foundation. *Am J Kidney Dis* 1995;25:107–112.
7. Bretzel RG. Hypertension, microalbuminuria and insulin resistance in diabetes mellitus. *Wien Klin Wochenschr* 1994;106: 774–792.
8. Intensive therapy and progression to clinical albuminuria in patients with insulin dependent diabetes mellitus and microalbuminuria. Microalbuminuria Collaborative Study Group, United Kingdom. *BMJ* 1995;311:973–977.
9. Allen TJ, et al. Salt restriction reduces hyperfiltration, renal enlargement, and albuminuria in experimental diabetes. *Diabetes* 1997;46:19–24. ■

Advance directives in internal medicine outpatient residents' clinics

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ABSTRACT: *This study assessed the frequency of obtaining advance directives from patients of internal medicine residents in two Baltimore teaching programs. A survey was conducted of the medical records of 130 patients in the medical clinics from these programs. Independent variables included age, sex, and race. Dependent variables included documentation of terminal illnesses, resuscitation or code status, and discussion regarding resuscitation status.*

Only 25 of 130 patients (19%) had a resuscitation status recorded; 24 were documented as full resuscitation and 1 as do not resuscitate. Of subjects older than 65 years, 23% had a resuscitation status. Although 4 of 37 subjects older than 65 years had a terminal illness, none had advance directives.

Patients' rights to participate in medical decisions and, in particular, to refuse unwanted treatments are well grounded in ethics and the law.[1] In the United States, the 1991 Patient Self-Determination Act requires all inpatient medical facilities certified by Medicaid or Medicare to advise patients of their rights to accept or refuse medical treatment and to provide information regarding state-provided advance directives. In addition, the Joint Commission on Accreditation of Health Care Organizations now recommends that health facilities provide assistance to patients who wish to complete advance directives.[2] Such directives are largely welcomed by physicians, patients, and families because they rely on informed consent, extend patient autonomy, and reduce physician concern about legal liability for actions carried out in good faith. Such discussions also increase patient and physician communication.

Table 1. Comparison by sex and resuscitation status.

	Full Resuscitation	DNR	No Directive	TOTAL
Men	11	0	29	40
Women	12	1	76	89
TOTAL	24	1	105	130

p = NS for men vs women

Several studies suggest that advance care planning can be effectively introduced in the outpatient setting[3] and that patients wish to discuss their preferences for life-sustaining care in the event of catastrophic illness.[4] In this study we sought to assess the frequency of the assessment of advance directives in medical patients followed by residents in two teaching hospitals in Baltimore since the enactment of the 1991 Patient Self-Determination Act.

Methods

Surveys were conducted of both inpatient and outpatient medical records of 99 patients who received their health care from the ambulatory internal medicine residents' clinic at Union Memorial Hospital in Baltimore and 31 patients who received their health care from the ambulatory internal medicine residents' clinic at Sinai Hospital in Baltimore.

The following information was collected: date of birth, sex, ethnicity, documentation of terminal illness, resuscitation status, documentation of the assessment of resuscitation status, and presence of living will or Durable Power of Attorney for Health Care. The data were analyzed using descriptive techniques. Analyses included evaluation of frequency and prevalance. The assessment of a potential relationship between the presence of advance directives and age, race, and sex was assessed using chi-square testing.

Patients were labeled with a terminal illness only if it was explicitly stated in the chart by their primary care physician. The criteria for determining whether an advance directive was invoked included 1) chart notes documenting discussions between patients or designated proxies regarding medical treatments decisions, 2) chart notes regarding do-not-resuscitate (DNR) discussions between physicians and patients or proxies, 3) presence of DNR order or advance directive in medical record, and/or 4) presence of full code order. The study was approved by the local institutional review board.

Results

Of the 130 cases reviewed, the mean age was 58 years, (± 16 years; range, 20–90 years). The study group was composed of 105 African-Americans, 24 Caucasians, and 1 Hispanic. The mean subject age did not differ significantly between the two facilities nor did the race composition. A disproportionate number of women were represented at the second facility, but documentation of advance directives was not associated with sex (**Table 1**). Of the 130 patients, 105 (81%) did not have a resuscitation status in the chart and 25 did (24 were full resuscitation and 1 was DNR).

None of the charts had documentation of a discussion regarding resuscitation status. Thus, the physician order in the admitting note was the unique documentation of the patient's advance directives in all the cases, even in the patient who had DNR orders. Living will or durable power of attorney for health care was noted on only three charts. There were seven patients with documented terminal illness, two of them were full resuscitation, and in the other five there was no mention of advance directive or resuscitation status. Although 4 of 37 subjects older than 65 years had a terminal illness, none had advance directives. Even in subjects over the age of 65 years, only 23% had a resuscitation status on the chart (not significantly different from all ages combined). There was no statistical difference between the assessment of advance directives and race.

Discussion

Advance directives allow patients to describe the extent of health care desired should there be circumstances that prevent communication of such wishes. Such decisions, when made in advance while patients are competent, provide guidance so adherence to the patients' wishes are more likely. Because an agent can also be designated to make decisions in the event of a disabling condition, advance directives can help relieve some of the burden from the agent for durable power of attorney for health care decisions. Patients' medical care wishes and treatments should be respected in accordance with accepted principles of medical practice, ethics, and law. However, our patients' wishes may be ignored if unknown or not recorded.

In the two teaching hospitals' internal medicine outpatient programs studied, advance directives were documented in less than 20% of the charts. In actuality this 20% could be an overestimate if we consider that in almost all cases the physician order to resuscitate in case of cardiac arrest is likely to reflect a

routine admission order rather than any real discussion of advance directives. In this study, such an order would have been included as documented advance directives.

Of special concern are patients with terminal illnesses. In our survey there were seven patients with terminal illnesses documented by their primary care physicians. One must question the appropriateness of aggressive medical care for these patients. Nevertheless, in our survey, discussions regarding advance directives were almost never recorded in terminal illnesses or in elderly patients.

Evidence shows that patients wish to discuss their preferences regarding the use of life-prolonging treatments with physicians.[4-6] Kellogg and colleagues[6] reported a reduction in depression rates in a group of homebound, chronically ill elderly people when advance directives were discussed with them. Unfortunately, our results are in concordance with growing evidence that advance directives are infrequently discussed with patients[3,6] and, even more disconcerting, with seriously ill patients.[1]

Why is there such lack of discussion between physicians and patients about advance directives? Cammer et al.[7] suggest that because physicians traditionally view themselves as healers of the sick, not planners for the death of patients, they may feel some discomfort in discussing death with their patients. Second, the disquieting evidence of poor communication between patients and physicians regarding choices in medical treatments suggests that the lack of a formal training program to develop communication skills with patients about advance directives is of importance. Finally, physicians may not address advance directives because of an unsubstantiated fear that such discussions might eliminate a patient's hope for recovery.

The survey was performed in the outpatient setting because it has been suggested that advance directives decisions should be made while patients are well.[3,5] Waiting until the patient is too ill to talk about aggressiveness of care might send the wrong message to the patients; talking during routine visits allows development of trust and understanding.[6] Patients may not be able to physically and psychologically focus their attention on the issue during the process of hospitalization.[3]

Documentation is probably as important as discussion of advance directives. In our survey, 19% of the charts had evidence of a discussion of advance directives, but it was not documented in any. It is required that advance directives be signed by the physician, witnessed, and then entered in the medical record. Of special concern are two groups of patients: patients with terminal illnesses and patients with DNR orders, in which the reasons and circumstances must be clearly stated in the medical records by the physician.

Although the findings in this study are useful, some limitations should be recognized. First, a retrospective chart review was used to obtain the data. Second, it was not possible to differentiate the full resuscitation default status found in many admission orders from a formal advance directive obtained with physician discussion. Finally, these findings may not be applicable to other patient populations or other residents' outpatient clinics. Further studies are needed to confirm the growing evidence that a lack of assessment and documentation of advance directives exists in the outpatient setting.

In conclusion, this study indicates that the assessment of advance directives was rarely performed by residents in the teaching hospitals evaluated, even in patients with documented terminal illnesses. Increasing the residents' awareness of the importance of advance directives coupled with more emphasis in the internal medicine residency curricula may increase the frequency of advance directives assessment. Furthermore, formal core curriculum changes to uniformly provide medical school instruction on end-of-life issues can be recommended. It is difficult to expect physicians at any level to adequately address advance directives or any end-of-life issue without proper training. It is hoped that, with some educational intervention, physicians will do a better job of discussing advance directives and adhering to patients' wishes regarding end-of-life care.

References

1. Virmani J, Schneiderman LJ, Kaplan R. Relationship of advance directives to physician-patient communication. *Arch Intern Med* 1994;154:909–913.
2. Emanuel LL, et al. Advance directives. Stability of patients' treatment choices. *Arch Intern Med* 1994;154:209–217.
3. Emanuel EJ, Weinberg DS, Gonin R, et al. How well is the patient self-determination act working?: an early assessment. *Am J Med* 1993;95:619–628.
4. Gilliek MR, Hesse K, Mazzapica N. Medical technology at the end of life. What would physicians and nurses want for themselves? *Arch Intern Med* 1993;153:2542–2547.
5. Edinger W, Smueker DR. Outpatients' attitudes regarding advanee direetives. *J. Fam Pract* 1992;35:650–653.
6. Kellogg FR, Crain M, Corwin J, Briekner PW. Life-sustaining interventions in frail elderly persons. Talking about choiees. *Arch Intern Med* 1992;152:2317–2320.
7. Cammer Paris BE, Carrion VG, Meditch JS, Jr, et al. Roadbloeks to do-not-resuseitate orders. *Arch Intern Med* 1993; 153:1689–1694. ■

MARYLAND MEDICAL HISTORY

Early patriot physicians of Maryland and the First Provisional Convention, June 22, 1774

This historical vignette describes an event that took place in Maryland during the earliest stage of the birth of our nation. Three physicians —William Baker, Thomas Sprigg Wooton, and Philip Thomas — were appointed as deputies to represent Frederick County at a meeting held in Annapolis on June 22, 1774. Subsequently, eight other conventions were held before the Declaration of Independence.

Other members of the medical profession served as delegates to these provisional, and later state, assemblies. Although exempt from military draft, early patriot physicians willingly served in the Continental Army and local militias. Others gave freely of their time as members of committees of safety, correspondence, and observation in their native counties.

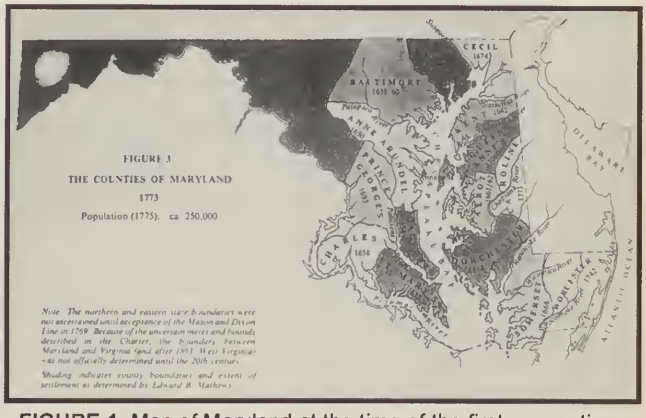

FIGURE 1. Map of Maryland at the time of the first convention, showing the year of founding of each county and the large size of Frederick County.
Reprinted with permission. Papenfuse EC, et al. A Biographical Dictionary of the Maryland Legislature 1635 - 1789, Vol. I, Baltimore: The Johns Hopkins University Press, 1979:XVI.

After the last Proprietary Assembly of April 1774, Governor Robert Eden regularly prorogued the assembly from June 1774 until May 1776, when he left Annapolis for England. Accompanied by his family, he boarded his majesty's frigate *Fowley* in Annapolis harbor, and although his departure was friendly, the people did not allow him to take his personal belongings. At the last minute, the commanding officer, Captain Montague, refused to surrender several indentured deserters and the ship was forced to leave.[1]

During this two-year prerevolutionary period, the citizens of the Province of Maryland held nine conventions in Annapolis. The first provisional convention, held June 22 to June 25, 1774, was an informal, extralegal meeting of committees to formulate Maryland's response to the Boston Port Act.

Deputies for this first session were determined by committee. Each county formed a committee of eligible voters and named a group of prominent, well-born, patriotic citizens to serve as delegates to the Annapolis meeting. Of the 115 deputies appointed by the counties of Maryland, three were physicians from Frederick County. The other delegates were wealthy or well-to-do planters (67), merchants (22), lawyers (21), several farmers, a minister, and a sheriff.[2]

FIGURE 2. Hungerford's Tavern, lower district, Frederick County. A sketch by Benjamin H. Latrobe (1764 - 1820), the architect of the U.S. Capitol.

Reprinted with permission. Coleman MM. Montgomery County - A pictorial history, Norfolk, VA: The Domming Company, 1934:27.

In Frederick County, three committees were formed because of its large area (**Figure 1**). Doctors William Baker and Thomas Sprigg Wootton, together with eight other deputies, were appointed by the inhabitants of the lower district, who met at Charles Hungerford's tavern on June 11, 1774 (**Figure 2**). On June 20, at a meeting held at the courthouse in Frederick Towne, Dr. Philip Thomas was chosen to serve as a member of a nine-man committee to represent the middle district.[3] A third committee to represent the upper district did not meet in time to send a delegation to the first session.

Of the 115 appointed deputies, 92 actually served; Dr. Baker was one of 23 who did not attend. (A search of archives in Annapolis and Baltimore failed to reveal why this group did not serve.) Both Dr. Baker and Dr. Thomas subsequently, in 1799, became founding fathers of the Medical and Chirurgical Faculty of the State of Maryland.[4]

At the first convention, 12 resolutions were adopted and a decision was made that each county would have one vote, with a majority to decide any controversial issue. The resolutions were concerned mainly with how to counteract an act of the British Parliament to close Boston Harbor. First, it was decided to join in an association of the colonies and wage a commercial war by stopping all imports from and all exports to Great Britain, as well as the West Indies, and support the people of Massachusetts with funds and supplies of food and clothing. Five deputies were named to attend the First Continental Congress in Philadelphia on September 5, 1774, and they were authorized to support the motions passed by the Congress. They were to return and report to a second provisional convention to be held in November to consider measures adopted at the Congress. No attempt was made for provisions to govern the province; the resolutions still referred to the colonies as British America. The majority of those present, as well as the average citizen, looked forward to a reconciliation with the mother country and loyalty to King George III was expressed.[5]

Dr. William Baker had a relatively brief public service career. He was appointed to serve in the First Provisional Convention, and later, in 1796, after moving to Prince George's County, was elected as a delegate to the Lower House of the General Assembly under Governor John H. Stone. As a patriot, he was active as a member of the Committee of Correspondence for Frederick County in 1775, and as a Justice for Montgomery County in 1778.

His home, "The Lodge," was in Prince George's County, but he speculated in land and owned large tracts in various parts of Maryland, as well as in Franklin County, Georgia. He died in 1812 in Georgetown, D.C.[2]

Dr. Wootton was a seasoned legislator, having served as an elected member of the lower House from Frederick County to the Proprietary Assembly sessions of 1761–1770, 1771, and the last one of 1773–1774. He was appointed to the First Provisional Convention and subsequently to the fourth, fifth, and ninth sessions. After the Declaration of Independence, he was elected to state general assemblies under governors Thomas Johnson, Thomas Sim Lee, William Paca, and William Smallwood.[2]

He was appointed to several committees of the various conventions and assemblies. He worked to establish a market house in Frederick Towne and to divide All Saints Parish in Frederick so that a new church could be opened in Prince George's Parish. He proposed that the raising of geese and swine be prohibited in Georgetown and he favored cutting a wagon road from Fort Cumberland to the nearest navigable water on the west side of the Allegheny mountains. Dr. Wooton is best known for having a bill passed at the Assembly in Annapolis on September 6, 1776, which created Mont-

gomery County, named after Richard Montgomery, the first general killed during the Revolutionary War.

Dr. Wootton died in 1789 at his home, "Discontent," located in the Upper Newfoundland District of Montgomery County. Since he had no progeny, his entire estate was left to his nephew, Turner Wootton of Queen Anne's County. In his will, he instructed Turner to make donations to the poor, "as I have always done."[6]

Serving in the first provisional convention was Dr. Philip Thomas's initial venture into politics. He was 27 years old and had settled in Frederick County five years previously, after completing his education in Philadelphia. Since he was the first qualified physician to arrive in Frederick Towne, he quickly developed a large, busy practice. On February 18, 1773, he married Jane Hanson, the daughter of John Hanson, Jr., his next-door neighbor.

John Hanson was also appointed to represent Frederick County at the meeting in Annapolis on June 22, but he failed to attend, probably because of poor health. He introduced his son-in-law to a career of public service, and as a dedicated patriot Dr. Thomas attended all of the assemblies to which he was appointed or elected. He served in the fourth convention and the three sessions of the first general state assembly under his friend and fellow churchman, Governor Thomas Johnson.

From 1774 to 1776, and during the entire war period of seven years, Dr. Thomas worked tirelessly as a commissioned officer of the militia, and as a member and later as chairman of the Committee of Correspondence for Frederick County. After the war he became a leader in the Federalist Party in Frederick County and participated in national politics as a Presidential Elector from Maryland during the first presidential election.[7]

His activities in the Federalist Party extended up to the time of his death in 1815, when he was about to realize that his son, John Hanson Thomas, would be elected as a Senator from the Western Shore of Maryland to the U.S. Congress. Unfortunately, Dr. Thomas and his son died within one week of each other during an epidemic. Alexander Contee Hanson, a cousin, was nominated and elected Senator in his place.

These three physicians freely and openly signed the *Association of Freemen*, as did numerous other Maryland physicians who served not only in the legislature, but also in the local Militia, the Continental Army, and on committees of observation and correspondence.

Their pledge was best expressed: "And we do unite and associate as one Band and firmly and solemnly engage and pledge ourselves to each other, and to America, that we will to the utmost of our power, promote and support the present opposition."[8]

Acknowledgments

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References

1. Beirne RR. *Portrait of a Colonial Governor; Robert Eden*, Vol. 45. Baltimore: Maryland Historical Society;1950:294.
2. Papenfuse EC, et al. *A Biographical Dictionary of the Maryland Legislature 1635 - 1789*, Vol.1. Baltimore: The Johns Hopkins University Press,1979:68.
3. Scharf JT. *History of Western Maryland*, Vol. 1. Philadelphia: Louis H. Everts Co., 1882:125–126.
4. Cordell EF. *The Medical Annals of Maryland*. Baltimore: Williams & Wilkins Co., 1903:22–25.
5. Everstine CN. *The General Assembly of Maryland 1634 - 1776*. Charlottesville, VA: The Michie Co.,1980:522.
6. Farquhar RB. *Historic Montgomery County, Maryland, Old Homes and History*. Baltimore: Monument Printing Co.; 1952:16–20.
7. Chase HV. Early Maryland Physicians and the First Presidential Election. *Md Med J* 1997;46:198–200.
8. Browne WH, ed. *Journal and Correspondence of the Council of Safety of Maryland 1775 - 1776*. Baltimore: Archives of Maryland, Maryland Historical Society, pp.15–16.

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What Your Patients

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  Scientific American – February 1998

Books, Etc.

Book review editor:
Chris Papadopoulos, M.D.

One Hundred Years of JAMA Landmark Articles.
Chicago, IL: American Medical Association, 1997. 657 pages, softcover.

This large glossy paperback is a delight to read. Originally published in 1984, it is now updated and re-edited. It includes two forewards, both brief and important to the book.

The format is simple. Each of the 68 chapters has an original *Journal of the American Medical Association* (*JAMA*) article (1884-1982) selected as a landmark article accompanied by a modern perspective (1983-1997) written by a solicited expert.

This may be history but it is not dull. At the risk of being sacrilegious, I am reminded of a special issue of a sports magazine I saved. It was full of the exploits of my childhood heroes—Willie Mays, Duke Snider, Bob Cousy, etc. It stirred the feelings of awe and admiration, so too does this volume from JAMA. The names from medical school textbooks come alive. One can read the original work and, even without the companion piece, see the change in direction that has followed.

A wide variety of interests and of authors are included; some are pure chemistry, some front line clinical discovery. Here is Francis Peabody's "The Care of the Patient" with a perspective by Pauline and David Rabin.

Our recent ignorance is amazing. Minot and Murphy's "Treatment of Pernicious Anemia by a Special Diet" dates from 1926. H. Houston Merritt's report on phenytoin for seizures was published in 1938.

Original studies on infectious disease range from the Dicks' brief, clear proof (with the help of human volunteers) that strep caused scarlet fever (1924); to a preliminary report on sulfanilamide for meningitis (1937), to articles by Salk (1955) and Sabin (1960) on polio vaccination.

Robert Herrick's eloquent and timeless description of the clinical features of acute coronary occlusion (1913) is matched with an equally eloquent perspective by J. Willis Hurst (1983).

Burrill Crohn's report on regional ileitis (1932) helped us all understand a bit better, but Joseph Kirsner's perspective acknowledges our persistent lack of etiology and specific treatment.

The list of fascinating chapters goes on and on: Blalock and Taussig on heart malformation surgery (1945); the description of acute radiation sickness (1946); the accusation of cigarette smoking as the cause of lung cancer (1950).

Most of the perspectives are helpful. Some are too long. Some of the invited authors seem too awed by the original. A few are great fun.

It is tempting to speculate about the motivation of tomorrow's researchers. Would surgical techniques be copyrighted? Would insulin and thyroid hormone structures be patented? Would any urge beyond profit inspire the sweat?

Naturally, not all of medical progress was published in *JAMA,* but it is a marvelous collection. Unlike my sports heroes, these are the real giants of humanity. This isn't show business, it's the real thing: human suffering and our attempts (many successful) to live healthier and longer with more safety in our day-to-day struggles.

Every physician should read (if not own) this book.

John W. Buckley, M.D.
Dr. Buckley is a psychiatrist with a private practice in Towson, Maryland, and former editor *Maryland Medical Journal.*

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Natural Hormone Replacement.
J.V. Wright and J. Morgenthaler.
Petaluma, California: Smart Publications, 1997. 128 pages, softcover.

This paperback presents a review of perimenopausal and postmenopausal endocrinology with a specific focus on traditional hormone replacement therapy contrasted against the reported merits and benefits of natural hormone replacement. Natural hormones are discussed in two parameters: (1) types and percentages of hormones in perimenopausal and postmenopausal women and in replacement therapy, and (2) sources of traditional and natural hormones.

The authors have attempted to accomplish this task in 11 chapters with several addendums. The chapters are divided into traditional aspects of perimenopausal and postmenopausal endocrinology and include such titles as, Hormones: Patentable, Natural, or Natural for Horses?; Preventing and Reversing Osteoporosis; Preventing Heart Disease; Testosterone and Other Androgens: Not Just for Men; and Using Natural Hormones.

The authors achieve relatively good success in their review of current medical knowledge of hormones of the menstrual cycle, menopausal symptoms, and pathology associated with menopause. They should be congratulated on the simplicity and clarity of their presentation. Unfortunately, in transitioning to their case for using natural hormone replacement they require a rather large leap of faith in convincing the reader of the superiority of natural hormone replacement versus the risk of using traditional hormone replacement or no replacement at all.

Despite the many good aspects of this book, some of the reported data are misleading. Recent data questioning traditional hormone therapy have been used out of context to support hormone usage. Considerable unsupported data, as well as numerous testimonials, have additionally been used to authenticate the reported superiority of natural over traditional hormone treatment. There are also significant omissions, such as the risk of androgens resulting in unfavorable liproprotein profile changes and the problem of oral progesterone absorption across the intestinal mucous membrane. The authors additionally attacked the merits or lack of merits of animal hormone study only to later use reported animal study results to support the use of natural hormones. If the authors are targeting the public as their readers, some of their technical data are somewhat more complex than the average reader may understand. If the authors are targeting this book for physicians, then considerable additional prospective randomized data are needed. In either case, downgrading the Food and Drug Administration and all pharmaceutical companies serves no purpose other than promoting sensationalism.

This topic is indeed important. We have much to learn regarding optimal hormone replacement therapy, and perhaps natural hormone replacement will prove to be of considerable benefit in the future. Making endocrine recommendations, however, without good supporting data, such as from prospective randomized studies, leaves considerable valid criticism of this book and the authors' recommendations. The authors state that data of this nature is not possible because of cost, but this is not an acceptable reason for supporting natural hormone replacement management without question. It is unfortunate that the authors, both with considerable experience and expertise, reported the many personal testimonials and/or some incomplete or unsupported data to justify their conclusion that traditional hormone replacement was all wrong and natural hormone replacement was all right. The result was a loss of credibility in their conclusions that leaves the true benefits of natural hormone therapy still in limbo.

This book should be read as a short review of perimenopausal and menopausal endocrinology, however, conclusions unsupported by evidence-based medicine should be taken only as an impression of the authors and not proven fact. Traditional medical therapy should continue to be questioned and challenged but not changed unless valid knowledge and data support a change.

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February, 1998

Adult Vaccination: Not Just for Kids Anymore

Thanks to the high rate of pediatric vaccination, fewer children die or face disability each year in the United States due to vaccine-preventable diseases. Unfortunately, their parents and grandparents are not so lucky: **thousands of adults die each year of vaccine-preventable diseases.** Medical professionals, working with concerned community groups, can effectively improve this situation.

Several reasons have been proposed for the low rate of adult vaccination. Perhaps many adults don't know that they can protect themselves (and, secondarily, their family members) by being vaccinated against serious diseases such as influenza, pneumococcal disease, tetanus, hepatitis B, hepatitis A, varicella, and other diseases. Perhaps they don't ask their doctors about vaccinations. Perhaps doctors could be more aggressive in promoting adult vaccination.

Whatever the reason(s), the size of the problem is illustrated by the following facts about influenza and pneumococcal disease in the U.S.:

- Approximately 5-10% of all elderly (2 to 3.6 million) persons become ill with influenza in a typical year.
- Up to 80,000 people over age 65 die every year from influenza and/or pneumococcal infections.
- Influenza vaccination is 80% effective in preventing deaths associated with influenza.[1]

Although Medicare covers both influenza and pneumococcal immunizations, *less than one-third of Maryland's older adults have been vaccinated against pneumococcus, and about half are not immunized annually against influenza.* In a recent study of state-specific influenza and pneumococcal vaccination levels for persons aged 65 or older, the Centers for Disease Control and Prevention (CDC) analyzed data from the 1995 Behavioral Risk Factor Surveillance System (BRFSS). BRFSS was a random-digit-dialed telephone survey of non-institutionalized adults 18 years of age or older who were asked if they had ever had a pneumonia shot and/or an influenza shot in the past 12 months. The results showed that, in Maryland, only 32.2% of people 65 and older have been immunized against pneumococcal disease and 57.3% received influenza vaccine in 1995. [2] These results are lower than the U. S. Department of Health and Human Services' immunization goal of 60% for both vaccines in *Healthy People 2000.*

Recognizing the need for a collaborative effort

to meet the *Healthy People 2000* goals successfully, the **Maryland Partnership for Prevention,** a coalition comprised of public and private organizations, was formed in August 1996. The Parnership's focus is on increasing influenza and pneumococcal immunization rates among Medicare beneficiaries. The coalition examined techniques to reach urban, minority seniors through church and grassroots organizations.

Another Partnership goal is to increase awareness among primary care physicians who can influence their patients' decision to receive immunizations. Most patients will not initiate a request for vaccination from their physicians. They will usually wait until vaccines are offered, if or when they have routine physical examinations.

Sometimes, simple systems are the most cost-effective in getting adults vaccinated. For example, physicians should have chart flags as reminders to vaccinate patients, or send letters to their older patients reminding them to make appointments for immunizations such as the yearly influenza vaccine. To discuss these issues, The Maryland Partnership for Prevention is planning a full day conference for private providers and anyone interested in adult immunization issues for the fall of 1998.

As an aid to practitioners, the chart on the following pages lists recommended vaccines, schedules, contraindications, and precautions. These recommendations are adapted from the recommendations of the Advisory Committee on Immunization Practices (ACIP).[3] Notice that, in addition to patients 65 years or older, health care workers are another critical segment of Maryland adults who need better protection from vaccine-preventable diseases.

Because of their frequent contacts with patients in all stages of illnesses, many of whom may be immunocompromised and therefore at special risk for infection, health care workers (including physicians, nurses, medical and nursing students, laboratory technicians, and administrative staff) can be exposed to, and inadvertently transmit, infectious diseases. Maintenance of immunity is therefore an essential part of prevention and control programs, to safeguard both health care workers and patients. Immunizations are recommended for health care workers in hospitals, health departments, schools, and nursing homes, as well as those who work in private physician offices. Appropriate prevention against hepatitis B, influenza, measles, mumps, rubella, and varicella are recommended[4] (Chart below).

A special note is in order for the newest of these vaccines: **Varivax**, for prevention of varicella (chickenpox). Susceptible adults usually have more severe disease and are at higher risk for varicella complications, such as bacterial superinfections of skin lesions, pneumonia, dehydration, and encephalitis. Following infection, varicella zoster virus (VZV) persists in a latent form that, when reactivated years later, can recur as zoster (shingles), a painful skin and central nervous system condition. The ACIP recommends that the vaccine be administered to adults who do not have a reliable history of chickenpox and who are likely to be in contact with persons at high risk for severe varicella disease (for example, health care workers and other adults who live with immuno-compromised persons).[5] See the Chart below for specific information.

References

1. Delmarva Foundation for Medical Care
2. Centers for Disease Control and Prevention (CDC), Morbidity and Mortality Weekly Report (MMWR), October 3, 1997, Vol. 46/ No. 39
3. CDC, ACIP statements, General Recommendations on Immunizations, MMWR, January 28, 1994; Update on Adult Immunization, MMWR, November 5, 1991
4. CDC, MMWR, Immunization of Health-Care Workers, December 26, 1997 / Vol. 46/ No.RR-18
5. CDC, MMWR, Prevention of Varicella, July 12, 1996 / Vol. 45/ No. RR-11

Summary of Recommendations for Adult Immunization

Adapted from the Advisory Committee on Immunization Practices (ACIP) by DHMH, Center for Immunization, January 1998

Vaccine name	For whom it is recommended	What is the usual schedule?	Contraindications and precautions*	Rules of simultaneous administration	Route
Influenza *"flu"*	• People who are 65 years of age or older. • People under 65 with medical problems such as heart disease, lung disease, diabetes, renal dysfunction, hemoglobinopathies, immunosuppression, and/or those living in chronic care facilities. Adults working or living with these people should be vaccinated as well. • Healthy pregnant women who will be in their 2nd or 3rd trimesters during the influenza season. • Pregnant women who have underlying medical conditions should be vaccinated before the flu season, regardless of the stage of pregnancy. • Anyone who wishes to reduce the likelihood of becoming ill with influenza.	• October through November is the optimal time to receive a flu shot to maximize protection, but the vaccine may be given at any time during the influenza season. • Give annually.	• Previous anaphylactic reaction to this vaccine, to any of its components, or to eggs. • Moderate or severe acute illness. (* - While moderate or severe acute illness is reason to postpone this or the other vaccines listed below, mild acute illness is not.)	Can give with all others but at a separate site.	IM
Pneumococcal	• All adults 65 years of age and older. • People under 65 who have chronic illness or other high risk factors including chronic cardiac and pulmonary diseases, anatomic or functional asplenia, chronic liver disease, alcoholism, diabetes mellitus, CSF leaks. Others at high risk include immunocompromised persons including those with HIV infection, leukemia, lymphoma, Hodgkin's disease, multiple myeloma, generalized malignancy, chronic renal failure or nephrotic syndrome, those receiving immunosuppressive chemotherapy (including corticosteroids), and those who received an organ or bone marrow transplant.	• Routinely given as a one-time dose. • Revaccination is recommended 5 years later for people at highest risk of fatal pneumococcal infection, or if the 1st dose was given prior to age 65.	• Previous anaphylactic reaction to this vaccine or to any of its components. • Pregnancy, review manufacturers insert. • Moderate or severe acute illness.	Can give with all others but at a separate site.	IM or SC
Hepatitis B	• Many high-risk adults need vaccination including: household contacts and sexual partners of hepatitis B carriers; users of injectable drugs; heterosexuals with more than one sexual partner in 6 months; men who have sex with men; patients in hemodialysis units; recipients of certain blood products; health care workers and public safety workers who are exposed to blood; clients and staff of institutions for the developmentally disabled; inmates of long-term correctional facilities, and certain international travelers. **Note:** Prior serologic testing may be recommended depending on the specific level of risk and/or likelihood of previous exposure. It is especially prudent to screen individuals who have emigrated from endemic areas. When HBsAg "carriers" are identified, offer them appropriate disease management. In addition, their household members and intimate contacts should be screened and, if found susceptible, vaccinated.	• Commonly used timing options for vaccination: 0, 1, 6 months 0, 2, 4 months 0, 1, 4 months	• Previous anaphylactic reaction to this vaccine, to any of its components, or yeast. • Moderate or severe acute illness.	Can give with all others but at a separate site.	IM
Hepatitis A	• Adults who travel outside of the U.S. (except for Northern and Western Europe, New Zealand, Australia, Canada, and Japan). • People with chronic liver disease; drug users; men who have sex with men; people with clotting disorders; people who work with hepatitis A virus in experimental lab settings (this does not refer to routine medical laboratories); and food handlers where health authorities or private employers determine vaccination to be cost-effective. **Note:** Prevaccination testing is likely to be cost-effective for persons >40 years of age as well as for younger persons in certain groups with a high prevalence of HAV infection.	See package insert.	• Previous anaphylactic reaction to this vaccine or to any of its components. • Moderate or severe acute illness. • Safety during pregnancy has not been determined, so benefits must be weighed against potential risk.	Can give with all others but at a separate site.	IM

References: ACIP statements, *General Recommendations on Immunization,* MMWR, 1/28/94, and *Update on Adult Immunization,* MMWR, 11/15/91.

Summary of Recommendations for Adult Immunization (continued):

Vaccine name	For whom it is recommended	What is the usual schedule?	Contraindications and precautions*	Rules of simultaneous administration	Route
Td (Tetanus, diphtheria)	• All adults.	Booster dose every 10 years after primary series of 3 doses.	• Previous anaphylactic reaction to this vaccine or to any of its components. • Moderate or severe acute illness. (* - See note under Influenza contraindications on previous page.)	Can give with all others but at a separate site.	IM
MMR (Measles, Mumps, Rubella)	• Adults born in 1957 and later, and certain others: College students Health care workers International travelers **Note:** Adults who were born prior to 1957 and who have a history of measles disease may assume immunity and do not need vaccine, but proof of immunity may be considered for health care workers.	2 doses, separated by at least 1 month	• Previous anaphylactic reaction to this vaccine, or to any of its components. (Anaphylactic reaction to eggs is no longer a contraindication to MMR, so skin testing isn't needed prior to vaccination.) • Pregnancy or possibility of pregnancy within 3 months. • HIV positivity is NOT a contraindication to MMR except for those who are severely immunocompromised. • Immunocompromised: includes cancer, leukemia, lymphoma, immunosuppressive drug therapy, including high dose steroids. • If blood products or immune globulin have been administered during the past 11 months, consult the ACIP recommendations regarding time to wait before vaccinating. • Moderate or severe acute illness. **Note:** MMR **NOT** contraindicated if a PPD test was done recently. However, PPD should be delayed if MMR was given within previous 30 days.	Can give with all others but at a separate site. If varicella and yellow fever are not given at the same time, space them at least 30 days apart from MMR.	SC
Varicella	• All susceptible adults in the following groups should be vaccinated: those likely to expose persons at high risk for severe illness. This includes family contacts of immunocompromised persons and health care workers. Also consider vaccination for susceptible day-care employees, residents and staff in institutional settings, non-pregnant women of childbearing age, and international travelers. **Note:** Adults with reliable histories of chickenpox (such as self or parental report of disease) can be assumed to be immune. For those who have no reliable history, serologic testing may be cost-effective to determine immunity (most adults are immune).	2 doses: give dose #2 4-8 weeks after dose #1.	• Previous anaphylactic reaction to this vaccine or to any of its components. • Pregnancy, or possibility of pregnancy within 1 month. • Immunocompromised persons due to malignancies and primary or acquired immunodeficiency including HIV/AIDS. **Note:** For those on high dose immunosuppressive therapy, consult ACIP recommendations regarding delay time. • Moderate or severe acute illness. **Note:** Manufacturer recommends that salicylates be avoided for 6 weeks after receiving varicella vaccine.	Can give with all others but at a separate site. If MMR and yellow fever are not given at the same time, space them at least 30 days apart from varicella.	SC
Inactivated Polio Vaccine (IPV)	• Travelers to areas or countries where poliomyelitis is epidemic or endemic. • Members of communities or specific population groups with disease caused by wild polioviruses. • Laboratory workers who handle specimens which may contain polioviruses. • Health-care workers with close contact with patients who may be excreting wild polioviruses. • Unvaccinated adults whose children will be receiving oral poliovirus vaccine.	See ACIP recommendations re: unique situations, schedules, and dosing information.	Refer to ACIP recommendations.	Can give with all others but at a separate site.	SC or IM

AIDS and HIV Fact Sheet

AIDS is caused by a virus called HIV (Human Immunodeficiency Virus)

When a person is infected with HIV, the virus infects and can kill certain cells in the immune system called T-helper cells. This weakens the immune system so that other specific infections can occur. The person is diagnosed as having AIDS (Acquired Immunodeficiency Syndrome) when they become sick with other specific infections or when the number of T-helper cells has dropped very low.

People at highest risk of AIDS and HIV infection are:

- People who share needles
- Men who have sex with other men
- Babies born to mothers who have HIV
- People who received blood transfusions or blood products before 1985 (antibody test available) which might have been infected with HIV
- Anyone who has sex with anyone who has or is at risk of AIDS or HIV infection

HIV is in blood and other body fluids

The virus is in the blood, semen, menstrual blood, vaginal secretions, and breast milk, and rarely in saliva and tears. The virus can be there even if the person has no symptoms of HIV infection or AIDS. People who are infected with HIV will carry the virus for the rest of their lives.

HIV is spread by exposure to HIV infected blood and HIV infected body fluids

HIV can be spread during sex, by sharing dirty needles to inject drugs, or from mother to baby (before or during birth, or by breast feeding). HIV is rarely spread by getting stuck by a needle, or by getting blood or other infected body fluids onto a mucous membrane (mouth or eyes) or onto broken skin. The virus is not spread by casual contact like living in the same household, or working with a person who carries HIV.

Certain symptoms and conditions may be associated with HIV/AIDS

These symptoms and conditions may include: fever, weight loss, swollen lymph glands in the neck, under arms or groin, white patches in the mouth (thrush), certain cancers (Kaposi's sarcoma, certain lymphomas, certain invasive cervical cancers), and infections (Pneumocystis pneumonia, certain types of meningitis, toxoplasmosis, certain blood infections, TB, etc.).

A blood test may tell if you have HIV infection or AIDS

You can get a HIV blood test at your doctor's office or at Counseling and Testing Sites throughout Maryland. Call your local health department or the AIDS Hotline (1-800-638-6252) for information.

There is treatment for people with HIV infection and AIDS

Many drugs are available to treat the infections and cancers associated with AIDS. There are also drugs available for people with HIV infection that can help prevent them from getting sicker.

HIV and AIDS are preventable:

- Abstinence, monogamy (with an uninfected partner), use of barrier protection (condoms) are the most protective prevention strategies.
- People who use IV drugs should try to get off drugs. If they can't they should always use new needles or should clean needles and works with bleach and water.
- It is recommended that people with HIV or AIDS should discuss their HIV serostatus with their doctors and dentists, and inform their sex and needle sharing partners.
- Women who are pregnant or planning a pregnancy are encouraged to talk with their doctor about getting tested for HIV. If a mother is known to be infected with HIV, there is treatment to decrease the chance that her baby will become infected.
- Practices called Universal Precautions and Standard Precautions such as the use of gloves, goggles, gowns, etc., are used by health care practitioners for prevention of transmission of any communicable disease including HIV.

Chickenpox Fact Sheet

Chickenpox is caused by a virus called varicella-zoster

Chickenpox is a highly contagious disease that is acquired through contact with the virus: directly by touching the blisters or respiratory secretions, or through the air. A person is usually infectious 1-2 days before the rash to 4-5 days after the start of the rash, or until the blisters have formed crusts.

Symptoms start about 2-3 weeks after exposure and include fever, tiredness, and an itchy rash with small blisters that dry up and form scabs in 2-4 days. More severe but rare problems or complications that could occur are pneumonia (especially in adults), skin infection, blood infection, or brain involvement (encephalitis). **If there are any signs of infection such as fever, redness, warmth, swelling, or if the fever persists or comes back after it has gone away, check with your doctor.**

Most people get chickenpox when they are young

Approximately 90% of chickenpox cases are in children 1-14 years of age, and 90% of people have had chickenpox by their early 20's. The disease is usually mild, and not life-threatening in otherwise healthy children, but is more serious in newborn babies and in adults.

Some people are at risk of complications from chickenpox

- Pregnant women who have not had chickenpox before (their unborn baby may be affected)
- An infant born to a mother who has not had chickenpox before
- A newborn baby whose mother has an onset of chickenpox 5 days before to 2 days after delivery
- People with leukemia, immune suppression, or immunodeficiency (including HIV)
- People who catch chickenpox as an adult

Children under 18 with chickenpox should not take salicylates (aspirin) or aspirin-containing products because of the risk of Reye syndrome. Use acetaminophen to treat fever.

Prevent chickenpox infection with varicella vaccine. Vaccine is recommended for:

- All healthy children 12-18 months of age (one dose)
- Children 19 months - 12 years of age (one dose) who do not have a reliable history of chickenpox
- Adolescents and adults older than 13 years (2 doses; 4-8 weeks apart) who do not have a reliable history of chickenpox and who are likely to expose persons at high risk for severe illness
- Varicella vaccine should be considered for susceptible people of any age at high risk of exposure

Vaccinated women of childbearing age should not get pregnant for 3 months after their last shot.

Prevent the spread:

- If you have chickenpox or shingles, stay away from others until the blisters are dry and crusted.
- Some newborn babies, any immunodeficient child, pregnant women, or persons over 14 years of age who have not had chickenpox before may need a shot of VZIG (varicella-zoster immune globulin) to try to prevent chickenpox after exposure. Check with your physician for further details.

Pregnant women should check with their doctors if exposed

Pregnant women with no reliable history of chickenpox who have been in contact with a person who has chickenpox, or if they have symptoms of chickenpox, should check with their doctors. **Each exposed pregnant woman needs to be individually evaluated.**

Chlamydia Fact Sheet

Chlamydia is a sexually transmitted disease (STD) caused by a bacterium

Chlamydia trachomatis is the bacterium that causes chlamydia.

Chlamydia is spread by sexual contact or from mother to baby

The bacterium is found in infected body fluids from the penis or vagina and spread by direct sexual contact.

If a woman has chlamydia and is not treated, she may get a serious infection in her reproductive organs, making it difficult for her to have children.

The eyes, ears, and lungs of babies can get infected if the mother has chlamydia at the time of childbirth. This type of lung infection in babies can be very serious.

Signs of chlamydia to look for:

- Discharge from the penis, vagina, or rectum
- For women, cramps or pain in the lower abdomen
- Burning or itching around the opening of the penis
- Pain in the testicles
- Pain when urinating

Symptoms of chlamydia start 7 to 30 days after sexual contact with an infected person.

Many men and women can have chlamydia and have no symptoms. They can still pass it to their sex partners even if they have no symptoms.

Chlamydia is treatable with antibiotics

Since the symptoms of chlamydia and gonorrhea are similar and both diseases can occur at the same time, everyone treated for gonorrhea should also be treated for chlamydia.

You can keep yourself from getting chlamydia

- Avoid infection by being monogamous, that is, only have sex with one person who only has sex with you
- Use condoms each and every time you have sex
- Know the signs of chlamydia

If you think you or your partners have chlamydia, don't have sex until you see your doctor

If you have chlamydia, tell your partners so that they can be treated

Don't have sex until both you and your partners have finished treatment.

The Johns Hopkins Medical Institutions

All courses at the Thomas B. Turner Building unless otherwise indicated. For information on continuing medical education activities, contact the Office of Continuing Medical Education, 720 Rutland Ave., Baltimore, MD 21205, 410-955-2959, Fax 410-955-0807 (e-mail: cmenet@som.adm.jhu.edu).

Basic concepts in dysphagia diagnosis and management, sponsored by Johns Hopkins Medical Institutions, Johns Hopkins Swallowing Center, at Renaissance Harborplace Hotel, Baltimore. Fee: $200/physicians; $140 residents, fellows, allied health professionals. **Mar. 4**

7th annual multidisciplinary symposium on dysphagia, sponsored by Johns Hopkins Medical Institutions, Johns Hopkins Swallowing Center, at Renaissance Harborplace Hotel, Baltimore. Fee: $465/physicians; $265 residents, fellows, allied health professionals. **Mar. 5–6**

Perioperative management, sponsored by Johns Hopkins University School of Medicine, at Marriott's Marco Island Resort, Marco Island, Florida. Credits: 21 Cat 1 AMA credits. Fee: $525/physicians; $490/residents, fellows, CRNAs, and allied health professionals. **After 2/8/98**—$550 and $515, respectively. **Mar. 8–11**

Men's health 1998, sponsored by Johns Hopkins Medical Institutions, department of urology and medicine, at Renaissance Harborplace Hotel, Baltimore. Fee: $150/physicians; $95/residents, fellows, and allied health professionals. **Mar. 20**

39th annual postgraduate institute for pathologists in clinical cytopathology, sponsored by the Johns Hopkins University School of Medicine. **Course A** (Home Study) March - April. **Course B** (Johns Hopkins Medical Institutions, Baltimore) April 20-May 1. Credits: 97 AMA Cat 1 credits (plus up to 10 hours video instruction). **Registration deadline Mar. 20**

PET/SPECT imaging in oncology: doing the right imaging the right way, sponsored by Johns Hopkins University School of Medicine and UCLA School of Medicine, at Sunset Village, UCLA School of Medicine, Los Angeles, California. Credits: 18.5 Cat 1 AMA credits. Fee: $595/physicians; $495/residents, fellows, allied health professionals. **Mar. 26–28**

Diagnosis and treatment of neoplastic disorders, sponsored by The Johns Hopkins Oncology Center. Credits: 14.5 Cat 1 AMA credits. Fee: $325/physicians; $150/residents, fellows, allied health professionals. **Apr. 2–3**

4th annual conference: update on Alzheimer's disease and other dementias, sponsored by The Johns Hopkins Medical Institutions Department of Psychiatry and Behavioral Sciences, at Baltimore Marriott Inner Harbor Hotel, Baltimore, Maryland. Credits: 7.5 Cat 1 AMA credits. Fee: $150/physicians; $120/psychologists; $95/residents, fellows, allied health professionals. **Apr. 4**

26th annual pediatric trends, sponsored by the department of pediatrics. Credits: 42 Cat 1 AMA credits. Fee: $650/physicians; $450/residents and fellows; After Feb. 20th: $695/physicians; $495/residents and fellows.

University of Maryland School of Medicine

For each course, additional information may be obtained by contacting the Program of Continuing Education, University of Maryland School of Medicine, Room 14-011, BRB, 655 W. Baltimore St., Baltimore, MD 21201 (410-706-3956), or by calling the phone number listed after a specific program. Fax 410-706-3103.

Diagnostic and therapeutic advances in glaucoma management, sponsored by the Maryland Center for Eye Care, University of Maryland School of Medicine. Fee: $125/MDs and PhDs; $65/residents; $85/fellows. Information: Nancy Cook, 410-328-5929, Fax 410-328-6346, e-mail NCOOK@aol.com. **Feb. 27**

University of Maryland School of Medicine (continued)

Self-Directed CME Activities

CD-ROM-based interactive multimedia radiology teaching file for Mac or PC w/single-user licenses (SUL), site licenses (SL), or multisite licenses (MSL). Credits: 60 Cat 1 AMA credits. Expires 9/98. Fee: $149/SUL, $395/SL, $595/MSL. Info: 410-528-8502.

Academic rounds and conference. Each academic department within the school of medicine has a series of lectures and/or seminars available to physicians. Cat 1 AMA credits available.

Miscellaneous

Imaging in the acute care setting, sponsored by the International Institute for Continuing Medical Education, at Fiesta Americana Resort Hotel, Cancun, Mexico. Credits: Approx. 26 Cat 1 AMA credits. Fee: $695/physicians; $495/residents, fellows, technologists. $695/physicians; $495/residents, fellows, technologists. **Feb. 16–20**

Up to date radiology 1998, sponsored by the University of California, Irvine Medical Center, at the Four Season's Resort Hotel, Newport Beach, California. Credits: Approx. 26 Cat 1 AMA credits. Fee: $695/physicians; $495/residents, fellows, technologists. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Feb. 16–20**

Breast imaging today and tomorrow, sponsored by The International Institute for Continuing Medical Education, at Disney's Grand Floridian Resort, Orlando, Florida. Credits: 23 Cat 1 AMA credits. Fee: $695/physicians; $495/residents, fellows, mammographers. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Feb. 16–20**

Imaging in the acute care setting, sponsored by The International Institute for Continuing Medical Education, at the Fiesta Americana Resort Hotel, Cancun, Mexico. Credits: 22 Cat 1 AMA credits. Fee: $695/physicians; $500/residents, fellows, technologists. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Feb. 16–20**

Cardiovascular health: coming together for the 21st century – a national conference, sponsored by the National Heart, Lung, and Blood Institute, the Cardiovascular Disease Outreach, Resources, and Epidemiology Program, the University of California San Francisco, and the California Cardiovascular Disease Prevention Coalition, at the Hyatt Regency Embarcadero Hotel – on the Waterfront, San Francisco, California. Fee: $350. Info:415-476-5808. **Feb. 19–21**

Neuro/ENT imaging: review and update, sponsored by the International Institute for Continuing Medical Education, at the Ritz-Carlton, San Juan Hotel and Casino, Isla Verda, Puerto Rico. Credits: 26 Cat 1 AMA credits. Fee: $695/physicians; $495/residents, fellows, technologists. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Feb. 19–23**

Vaccine safety and risk communication, presented via satellite by the Centers for Disease Control and Prevention, hosted by the Center for Immunization, Maryland Department of Health and Mental Hygiene. Fee: none. info: Sandra Kash, RN, 410-767-6679. **Feb. 26**

38th annual meeting and scientific session, sponsored by the Maryland Thoracic Society, the medical arm of the American Lung Association of Maryland, at the Renaissance Harborplace Hotel in Baltimore. Info: Ann Eder, 410-560-2120. **Mar. 1**

Practice guidelines and outcomes data in oncology, sponsored by the National Comprehensive Cancer Network (NCCN), at the Marriott Harbor Beach Hotel, Fort Lauderdale, Florida. Info: 516-424-8900, ext. 300. **Mar. 1–4**

Miscellaneous (continued)

13th annual postgraduate magnetic resonance imaging, sponsored by the University of California, San Diego, at the Hotel Del Coronado, San Diego, California. Credits: 28 Cat 1 AMA credits. Fee: $696/physicians; $495/residents, fellows, technologists, nurses. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Mar. 1–6**

Thoracic imaging 1998, sponsored by the Society of Thoracic Radiology, at the Ritz-Carlton Isla Verde, San Juan, Puerto Rico. Fee: $650/physicians; $350/resdients, fellows, technologists.. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Mar. 8–12**

Update in general diagnostic imaging/breast imaging, sponsored by the University of Chicago, at Boca Raton Resort Hotel & Spa, Boca Raton, Florida. Credits 34.50 (18.75 mammography) Cat 1 AMA credits. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Mar. 9–13**

Clinical Breast Examination Using Mammacare Technique—A Practicum for Physicians, sponsored by the Medical and Chirurgical Faculty of Maryland, at Anne Arundel Medical Center in Annapolis. Info: Jade Leung, 410-539-0872 or 1-800-492-1056. **Mar. 11**

Carrying for women with vaginal infections, baceterial vaginosis, trichomoniasis, vulvovaginal candidiasis, presented via satellite by the National Network of STD/HIV Prevention Training Centers. info: 303-436-7226 or http://inpharmatics.uc.edu/stdptc.html. **Mar. 12**

Winter multidisciplinary course: highlights in radiology, medicine, and surgery, sponsored by Duke University Medical Center, at the Silvertree Hotel, Snowmass, Colorado. Credits: 16 general radiology (6 mammography) Cat 1 AMA credits. Fee: $595/physicians; $375/residents, fellows, technologists. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Mar. 15–20**

Breast imaging and interventions: basics, conflicts, and controversies, sponsored by the International Institute for Continuing Medical Education, at the Ritz-Carlton Resort Hotel, Phoenix, Arizona. Fee: $695/physicians; $495/others. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Mar. 16–19**

1st annual meeting of the American Society of Spine Radiology: practical spine imaging symposium, sponsored by the American Society of Spine Radiology, at the Fiesta Americana Coral Beach Resort, Cancun, Mexico. Credits: 18 Cat 1 AMA credits. Fee: $350/ASSR members; $550/physician non-ASSR members; $250/residents, fellows, technologists. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Mar. 18–21**

Cancer prevention in community practice, sponsored by the Medical and Chirurgical Faculty of Maryland, at the Med Chi building in Baltimore City. Free CME credits available. Info: Carol Schwartz, 410-539-0872 or 1-800-492-1056. **Mar. 19**

Internal derangements of joints: MR imaging, sponsored by the International Institute for Continuing Medical Education, at the Ritz-Carlton Hotel, Atlanta, Georgia. Credits: 19.5 Cat 1 AMA credits. Fee: $595/physicians; $395/residents, fellows, technologists. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Mar. 20–22**

4th annual course on management of the HIV-infected patient: a practical approach for the primary care practitioner, sponsored by the Center for Bio-Medical Communication, Inc., at the Crowne Plaza Manhattan Hotel, New York. Credits: 20 Cat 1 AMA credits. Fee: $495/physicians; $295/physicians in training and allied health professionals (for registrations by 2/5/98). Info: 201-385-8080, Fax 201-385-5650. **Mar. 20–22**

Miscellaneous (continued)

1st annual course on clinical decision in urogynecology, sponsored by the Center for Bio-Medical Communication, Inc., at the Crowne Plaza Manhattan Hotel, New York. Credits: 10.5 Cat 1 AMA credits. Fee: $575 (after 1/15/98). Info: 201-385-8080, Fax 201-385-5650, E-mail scunniffe@cbcbiomed.com. **Mar. 20–22**

Clinical Breast Examination Using Mammacare Technique—A Practicum for Physicians, sponsored by the Medical and Chirurgical Faculty of Maryland, at the Med Chi building in Baltimore City. Info: Jade Leung, 410-539-0872 or 1-800-492-1056. **Mar. 25**

Type 2 diabetes in the elderly, sponsored by the American Diabetes Association of Arizona with the National Institute of Diabetes and Digestive Kidney Disease, at the Buttes Resort, Tempe, Arizona. Info: Fax 602-861-0542. **Mar. 27–29**

Clinical infectious disease course, sponsored by the Center for Bio-Medical Communication, Inc., at The Plaza Hotel, New York, NY. Credits: 18.75 Cat 1 AMA credits. Fee: $645/physicians; $475/physicians in training and allied health professionals (after 1/16/98). Info: 201-385-8080, Fax 201-385-5650, e-mail jrosenberg@cbcbiomed.com. **Mar. 27–29**

The missed or delayed diagnosis of breast cancer: understanding the causes and developing effective risk management strategies, sponsored by the International Institute for Continuing Medical Education, at the Plaza Hotel, New York, New York. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Apr. 2–4**

1998 annual session, American College of Physicians, at San Diego Convention Center, San Diego, California. Credits: up to 29 Cat 1 AMA credits. Info: 800-523-1546, ext. 2600; 215-351-2600; http:\\www.acponline.org. **Apr. 2–5**

Epidemiology and prevention of vaccine-preventable diseases, presented via satellite by the Centers for Disease Control and Prevention, hosted by the Center for Immunization, Maryland Department of Health and Mental Hygiene. Credits: CMEs available. Fee: none. Info: Sandra Kash, RN, 410-767-6679. **Apr. 9, 16, 23, 30**

Interventional radiology, sponsored by the University of California, San Diego, at the Hotel Del Coronado, San Diego, California. Credits: 6.25 Cat 1 AMA credits. Fee: $150/physicians; $115/residents, fellows, technologists. Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Apr. 11**

18th annual resident's radiology review course, sponsored by the University of California, San Diego, at the Hotel Del Coronado, San Diego, California. Credits: 49 Cat 1 AMA credits. Fee: $750/physicians; $500/residents, fellows, technologists, allied health professionals ($450/for two or more registering at same institution at same time). Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Apr. 12–17**

18th annual national pediatrics infectious diseases seminar, sponsored by the National Pediatric Infectious Diseases Foundation and the University of Texas Southwestern Medical Center at Dallas, at the Grand Hyatt Washington Hotel, Washington, D.C. Credits: 23 (also AAP, AAFP, ACPE and Contact). Fee: $495/physicians; $350/residents, fellows, allied health professionals. Info: Robert W. Kruse & Associates, Inc., 317-488-1234, Fax preferred 317-488-1254, http://www.cwiweb.com/npids. **Apr. 15–18**

3rd annual breast imaging and interventions, sponsored by the University of California, San Diego, at the Hotel Del Coronado, San Diego, California. Credits: 15 Cat 1 AMA credits. Fee: $450/physician ($375 if attending RRRC: 64 hours); $275/residents, fellows, technologists, allied health professionals ($250 if attending RRRC: 64 hours). Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Apr. 17–19**

Miscellaneous (continued)

Advanced cardiac and oncologic nuclear medicine for the radiologist, sponsored by the University of Florida, College of Medicine, at Disney's Coronado Springs, Orlando, Florida. Credits: 8 Cat 1 AMA credits. Fee: $200/physicians; $150/residents, fellows, technologists, UF Alumni ($130/for two or more registering at same time from same institution). Info: Ryals & Associates, Inc., 770-641-9773, Fax 770-552-9859 (e-mail: webmaster@ryalsmeet.com). **Apr. 18**

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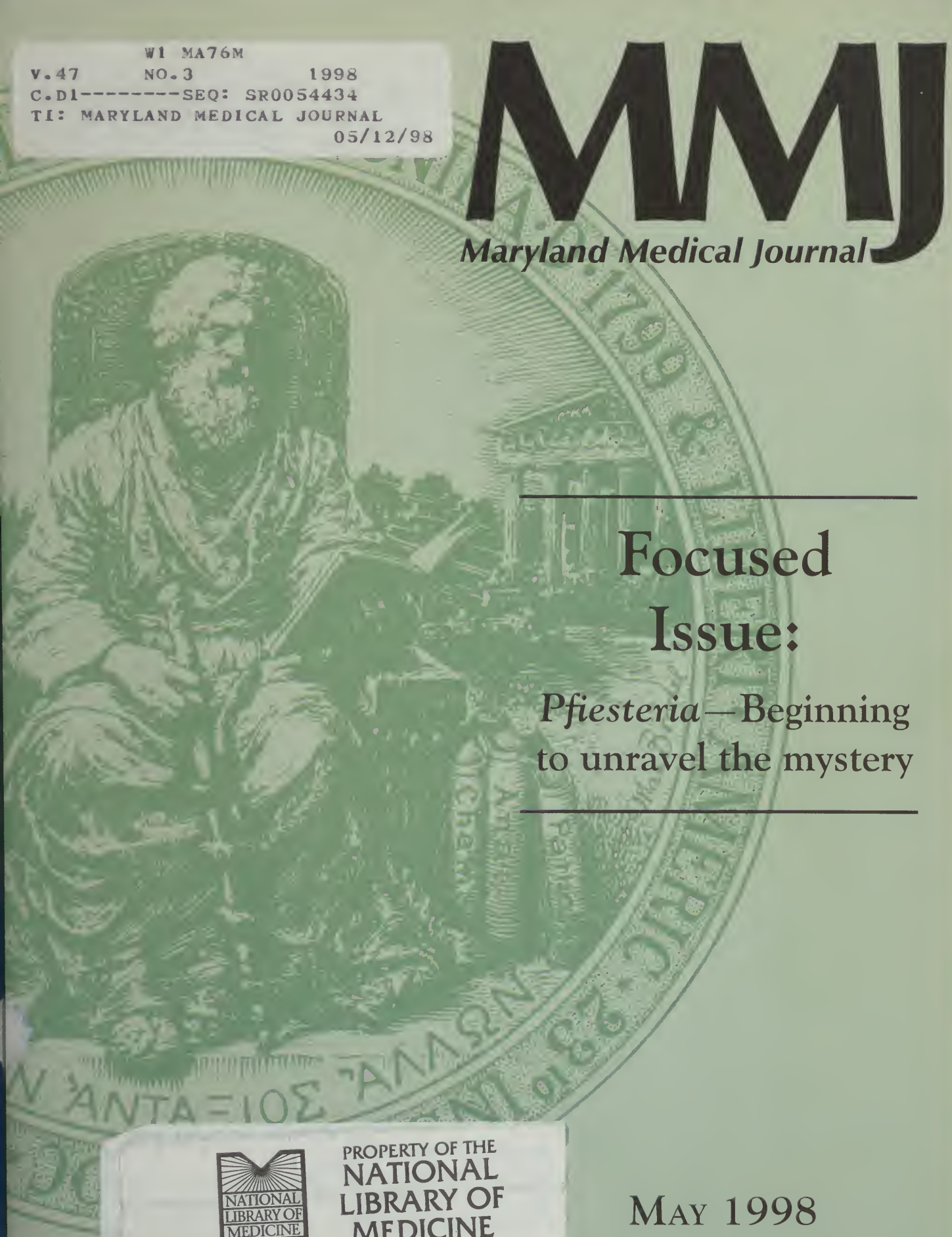

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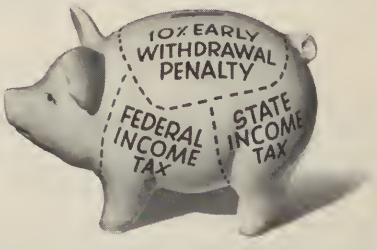

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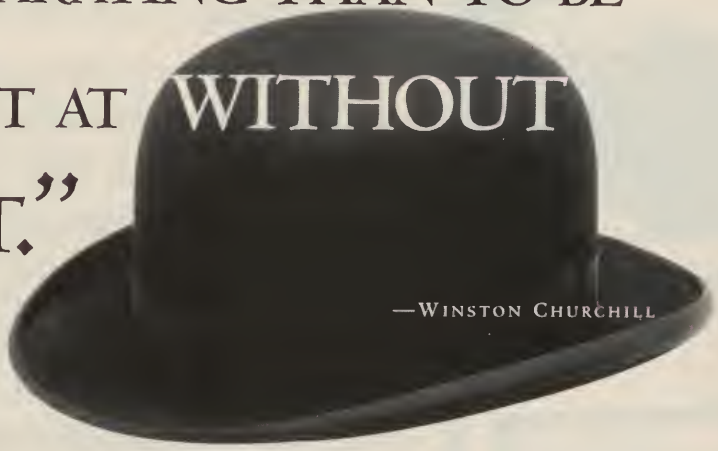

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Editor's Notes

As we noted in a previous issue, the *Pfiesteria* problem in Maryland's waterways, and the illnesses reported by some persons after physical exposure to these waters, is a recent, complex, confusing enigma. This issue is dedicated to updating our readers on what is presently known (most of what is presented has never before been published) and the direction of anticipated further studies. It is also intended to alert our physicians to the possible occurrence of this condition in their patients and to the support physicians can expect from the state agencies. As more information evolves, our readers can look to Med Chi for additional guidance.

We are indebted to J. Glenn Morris, Jr., M.D., and Lynn M. Grattan, Ph.D., for their superb efforts in acting as editors of this issue and in obtaining the cooperation of many who have been in the forefront studying this phenomenon.

MARION FRIEDMAN, M.D.
Editor ■

Pfiesteria!? An introduction

J. Glenn Morris, Jr., MD, MPH&TM

Dr. Morris is a professor of medicine at the University of Maryland School of Medicine.

In the fall of 1996, watermen working along the lower Eastern Shore of the Chesapeake Bay began to see fish with unusual "punched-out" lesions and erratic swimming patterns. They also began to note vague symptoms of fatigue, skin irritation, and difficulties with memory. Problems receded during the winter months, but, with the advent of Spring 1997, there were reports of increasing numbers of fish with lesions, and increasing human health problems. Water samples collected from the Pocomoke River in May and August were examined by Dr. JoAnn Burkholder at North Carolina State University and Dr. Karen Steidinger of the Florida Department of Environmental Protection. The samples demonstrated the presence of *Pfiesteria piscicida* and at least one other toxic *Pfiesteria*-like dinoflagellate species. In North Carolina there had been well-documented cases of illness resulting from laboratory exposure to *Pfiesteria* and its toxins,[1] and there were anecdotal reports suggesting that illness could result from environmental exposure to waterways affected by *Pfiesteria*. However, uncertainties remained about the clinical significance of the symptoms being reported in Maryland, and the relationship to waterways in which there was toxic *Pfiesteria* activity.

In this setting, the Maryland Department of Health and Mental Hygiene asked the University of Maryland and Johns Hopkins medical schools to form an expert team to evaluate the possible human health effects of exposure to *Pfiesteria*-affected rivers and estuaries. Team members included Drs. Glenn Morris, Lynn Grattan, Mark Lowitt, and David Oldach from the University of Maryland, and Drs. Patricia Charache and Trish Perl from Johns Hopkins. Working in close collaboration with the Maryland Department of Health and Mental Hygiene, the Somerset County Health Department, and local physicians, the team

examined an initial 13 persons on August 22 who had moderate to high exposure to the Pocomoke River (where *Pfiesteria* activity had been concentrated). Results of this evaluation suggested that exposure to affected waterways resulted in a distinct clinical syndrome, characterized by subjective and objective difficulties with learning and memory, and, less consistently, skin complaints and skin lesions. Other reported symptoms included headaches, respiratory and eye irritation, diarrhea, and muscle cramps; however, the clinical significance and predictive value of these latter complaints remains to be determined. Physical examination of these initial 13 persons was unremarkable, except for the already noted dermatologic and neuropsychologic findings. No consistent laboratory abnormalities were detected.

Since August 22, over 50 persons have been evaluated by members of the medical team as part of ongoing studies. Analysis of the data from these persons is still in progress, and, as data accumulate, it is clear that there is still a great deal that we do not understand about the clinical illnesses seen among persons exposed to *Pfiesteria* and its toxins. There is an urgent need for further research on the dinoflagellate itself, the toxins that it produces, and the ways in which these toxins affect humans. Epidemiologic studies are needed to evaluate routes of exposure and risks associated with specific activities. Clinically, we need a better understanding of the range of symptoms that may occur in association with exposure to affected waterways. Anecdotal reports suggest that acute exposure to waterways with a high level of toxic *Pfiesteria* activity results in an acute confusional syndrome, with respiratory and eye irritation, headache, and flu-like symptoms[2]; however, these observations need to be documented and linked with specific toxin exposure. Conversely, there may be very mild or subclinical symptoms associated with low levels of exposure that are currently unrecognized.

While there is still much that we do not know about *Pfiesteria* and *Pfiesteria*-related illness, it is also apparent that we have learned a great deal about this syndrome in a relatively short period of time. The *Maryland Medical Journal* has already published a *Pfiesteria* case series[2] and a description of the initial public health response to this microorganism,[3] and it is likely that other clinical and epidemiologic studies on *Pfiesteria* will be published in this and other journals within the next 6 to 12 months. However, as we approach the possible beginning of another *Pfiesteria* season, we felt that it was appropriate to assemble a collection of papers that summarize some of our current understanding of *Pfiesteria* and the illnesses that may be caused by its toxins. We felt that this material would be of particular relevance to physicians practicing in Maryland, given the heavy press coverage which has been given to *Pfiesteria* and the need to deal with patients who feel that they may have been exposed to the dinoflagellate. Papers in this issue delve into marine biology, epidemiology, and clinical management; clinical articles focus specifically on neuropsychologic, neurologic, and dermatologic issues, as these are the areas that, in our experience, dominate the clinical presentation. Given our still rudimentary knowledge about this clinical syndrome, we have also listed resources for physicians, so that if questions arise they will know where to call.

We hope that this material will be of help. We look forward to an ongoing collaboration with Maryland physicians as we try to better understand this new clinical syndrome.

Acknowledgment

Financial support for the studies of the human health effects of Pfiesteria *exposure has been provided by the Maryland Department of Health and Mental Hygiene, and grants from the Heinz Family Foundation and the National Institute of Environmental Health Sciences.*

References

1. Glasgow HB, Jr, Burkholder JM, Schmechel DE, et al. Insidious effects of a toxic estuarine dinoflagellate on fish survival and human health. *J Toxicol Environ Health* 1995;46:501–522.
2. Shoemaker RC. Diagnosis of *Pfiesteria*-human illness syndrome. *Md Med J* 1997;46:521–523.
3. Matuszak DL, Sanders M, Taylor JL, Wasserman MP. Toxic *Pfiesteria* and human health. *Md Med J* 1997;46:515–521. ■

Fish lesions in the Chesapeake Bay: *Pfiesteria*-like dinoflagellates and other etiologies

Andrew S. Kane, M.S., Ph.D., David Oldach, M.D., and Renate Reimschuessel, V.M.D, Ph.D.

From the University of Maryland where Drs. Kane and Reimschuessel are with the Aquatic Pathobiology Center, department of pathology, and Dr. Oldach is with the department of medicine.

ABSTRACT: *Ulcerative lesions and mass mortalities of Atlantic estuarine fish, particularly menhaden (*Brevoortia tyrannus*), have been associated with exposure to* Pfiesteria*-like dinoflagellates and their toxins. We collected fish from the Chicamacomico River, Maryland, and observed solitary ulcerative lesions on the majority of menhaden sampled. One striped bass (*Morone saxatilis*) had an area of reddening around the base of the dorsal fin. Bluegill (*Lepomis macrochirus*), channel catfish (*Ictalurus punctatus*), yellow perch (*Perca flavescens*), and carp (*Cyprinus carpio*) were externally nonremarkable. Histologically, ulcerative menhaden lesions demonstrated a marked chronic inflammatory infiltrate in large areas of exposed necrotic muscle. The ulcers contained granulomata with fungal hyphae in the necrotic tissue. Gram-negative rod-shaped bacteria were also observed in the lesions, a common finding in ulcers of aquatic organisms. Our data suggest that typical ulcerative lesions observed on fish from areas of* Pfiesteria*-like dinoflagellate blooms are reflective of dermatosis, which may be related to a variety of individual or combined environmental stressors. Exposure to dinoflagellate toxin(s) potentially represents one such stressor. The role of* Pfiesteria*-like dinoflagellate toxin in fish primary lesion development is currently under investigation.*

Background

Fish, like mammals, are susceptible to a variety of environmental stressors that may directly cause, or indirectly predispose, them to develop

Reprints: Andrew Kane, Ph.D., University of Maryland, Department of Pathology, 10 S. Pine Street, Baltimore, MD 21201

different types of lesions. These stressors may be biologic (bacterial, viral, fungal, parasitic), chemical (pollutants, toxins, suboptimal water quality, hormonal changes due to photoperiod or breeding), and/or physical (rapid water temperature change, trauma). Disease outbreaks and mortality occur naturally in all wild populations. What causes concern, however, is when huge numbers (i.e., hundreds of thousands) of fish exhibiting lesions, morbidity, or death occur in a relatively short time period. Such is the case for fish kills co-occurring during toxic blooms of *Pfiesteria*-like dinoflagellates. A toxic dinoflagellate (or algal) bloom is a notable increase in cell numbers (density) and predominance of at least one harmful dinoflagellate species. Because *Pfiesteria*-like dinoflagellates do not always produce toxin,[1] the mere presence of these dinoflagellates may not necessarily be harmful.

TABLE 1. Chronology of toxic dinoflagellate observations and associated fish health problems in Maryland. Data compiled by Maryland Sea Grant (M. Leffler, personal communications, 1998).

1992 (summer)	*Pfiesteria piscicida* identified from Jenkins Creek on Choptank River.[2]
1994	*Pfiesteria* associated with laboratory fish mortalities at Benedict Estuarine Research Laboratory on the Patuxent River (D. Breitburg, personal communications, 1997).
1996	*Pfiesteria* associated with laboratory fish mortalities at Academy of Natural Sciences Research Center on St. Leonard's Creek off the Patuxent River (D. Breitburg, personal communications, 1997).
1996 (August)	*Pfiesteria piscicida* and other dinoflagellate species associated with striped bass mortalities in culture ponds at HyRock Farms on Manokin River off Kings Creek.[25]
1997 (summer/fall)	*Pfiesteria piscicida* identified from Pocomoke River/fish kills occurred.
1997	Laboratory fish mortalities at Academy of Natural Sciences Research Center on St. Leonard's Creek off the Patuxent River (D. Breitburg, personal communications, 1997).
1997 (August)	Striped bass mortalities in culture ponds at HyRock Farms on Manokin River off Kings Creek; *Pfiesteria piscicida* not identified while other dinoflagellates were.
1997 (September)	Presence of *Pfiesteria*-like dinoflagellates confirmed on Manokin River off Kings Creek/fish kills occurred.
1997 (September)	Presence of *Pfiesteria*-like dinoflagellates confirmed on Chicamacomico River/fish lesions and mortalities.

Pfiesteria-like dinoflagellates have been observed in tributaries of the lower Chesapeake Bay and the Tar-Pamlico River Estuary (the two largest estuaries in North America), and as far south as St. Johns River and Pensacola Bay in Florida.[2-4] A recent chronology of toxic dinoflagellate observations and associated fish health problems in Maryland is listed in **Table 1**. The types of lesions noted on many fish sampled from these waters are sizable, deep ulcers.

The organism implicated with these lesions and the fish kills is a dinoflagellate, *Pfiesteria piscicida*. *P. piscicida* is a newly identified genus and species in a newly recognized dinoflagellate family, Pfiesteriaceae,[5] named after the late Dr. Lois A. Pfiester. Dr. Pfiester was an experimental and field phycologist who described and unraveled some of the many complex sexual cycles of freshwater dinoflagellates (e.g., Pfiester and Popovsky).[6] The specific epithet, *piscicida* (from Latin), means fish killer. Close relatives of *Pfiesteria*, yet to be taxonomically confirmed, have also been found in the Chesapeake Bay and other areas, and have been implicated with fish lesions and mortalities, hence the term *Pfiesteria*-like dinoflagellates.

Pfiesteria has a complex life cycle consisting of amoeboid, flagellated, and encysted forms. Further, there is a high degree of pleomorphism within each of these forms; Burkholder and Glasgow[1] suggest over 20 distinct stages. *P. piscicida* also varies greatly in size: flagellated forms range from 5 to 18 μm; amoeboid forms range from <5 to 250 μm, and cysts have been observed from 10 to 33 μm.[5] A variety of environmental cues are responsible for the dinoflagellate's growth, sexual reproduction, encystation, and toxin production. The presence of live fish stimulates exotoxin.[1] Recent evidence suggests that there are multiple toxin forms (lipophilic and hydrophilic), each having different effects on fish and possibly humans. *Pfiesteria* is known to feed on algal prey as well as dead or dying fish,[1] a heterotrophic feeding ecology. However, *Pfiesteria* is capable of ingesting algal cells, emptying their contents, and stealing their chloroplast (the light-sensitive, energy-producing organelle), a phenomenon termed cleptochloroplasty.[5] *Pfiesteria* is a relatively rugged dinoflagellate covered with a series of armored

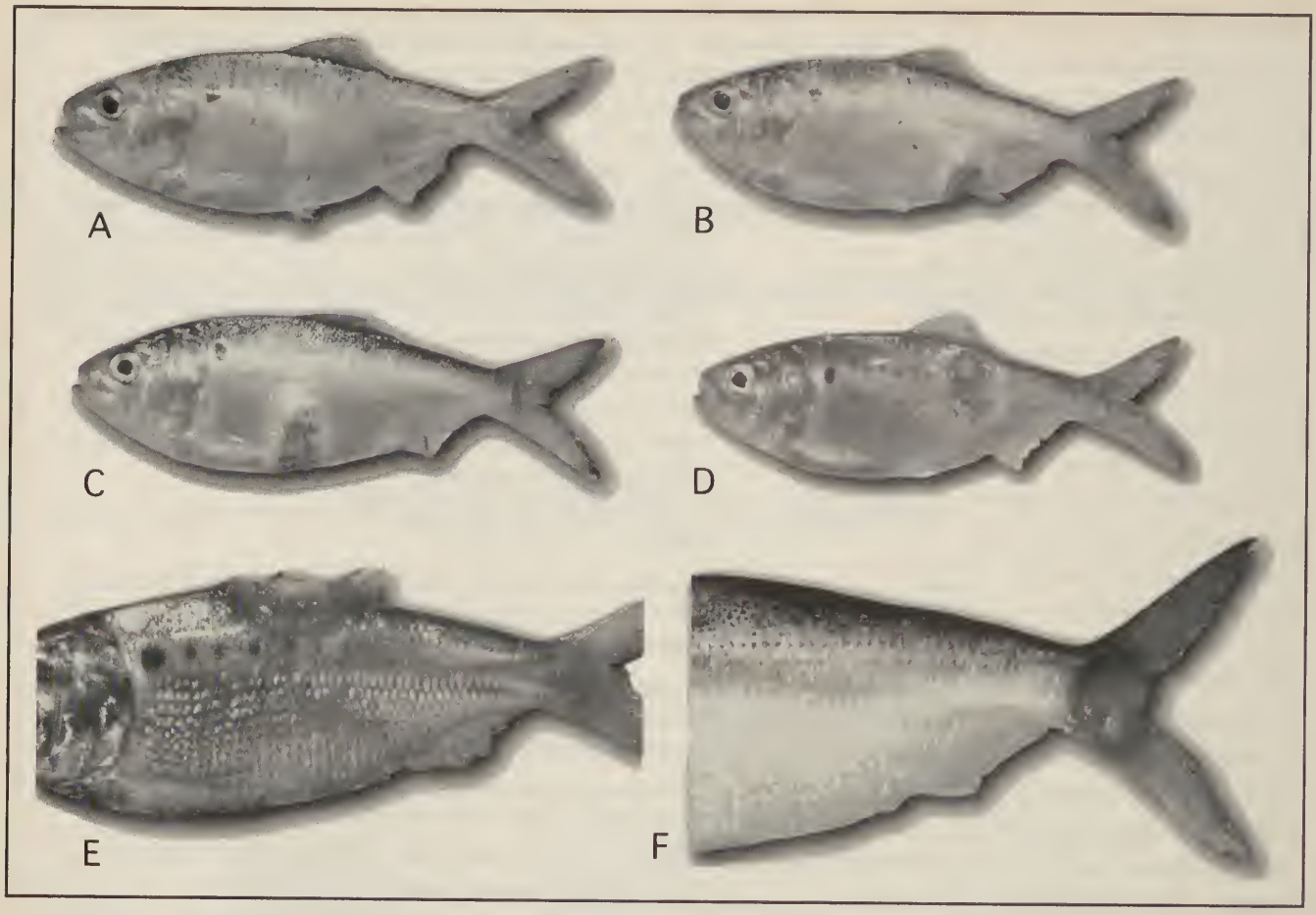

FIGURE 1. External lesions observed on menhaden sampled from the Chicamacomico River suspected to be associated with toxic dinoflagellates. (A) flat, reddened lesion centrally located on the side of the fish, (B through E) chronic ulcerative lesions with necrotic centers which penetrate the epidermis, dermis and musculature, at the anus, mid-abdomen, trunk, and dorsal fin area, respectively, and (F) a round, raised, friable red nodule at the base of the caudal fin.

plates. The plate configuration is used for electron microscopic species-level identification.

Although there are many ichthyotoxic dinoflagellates, readers may be most familiar with *Gymnodinium breve*, a toxic red-tide dinoflagellate that produces brevetoxins. Brevetoxin is the causative agent of neurotoxic shellfish poisoning, which effects fish, shellfish, birds, marine mammals, and humans.[7] In contrast to *P. piscicida*, *G. breve* is a naked dinoflagellate, without an array of external armored plates. *G. breve* produces an endotoxin, which is released upon rupture of its soft outer membrane. Rupture can occur at the water surface due to wind action (which is why toxin aerosols affect humans), or when the fragile cells pass through the processes of fish gills, whereupon the toxin diffuses through the gill membrane and causes lethality if the cell concentration is sufficiently high.[8] Fish mortality caused by acute brevetoxin exposure occurs without pathologic lesions.[8,9]

Methods

Water temperature was measured using a hand-held thermometer and salinity was measured using a refractometer. Fish were collected in September 1997 from the Chicamacomico River, Maryland, using a 4-m diameter monofilament cast net. Repeated net casts were made over a period of several hours. Fish were photographed and subsequently sacrificed with buffered MS222. Skin scrapes and gill biopsies were performed and examined in the field from representative specimens. Tissue samples were preserved in 10 percent neutral buffered formalin and submitted for routine histologic processing.[10]

Results

Water quality variables evaluated at the collection site included temperature at 14° C and salinity of 3 parts per thousand (ppt); the water color was bluish-green with mod-

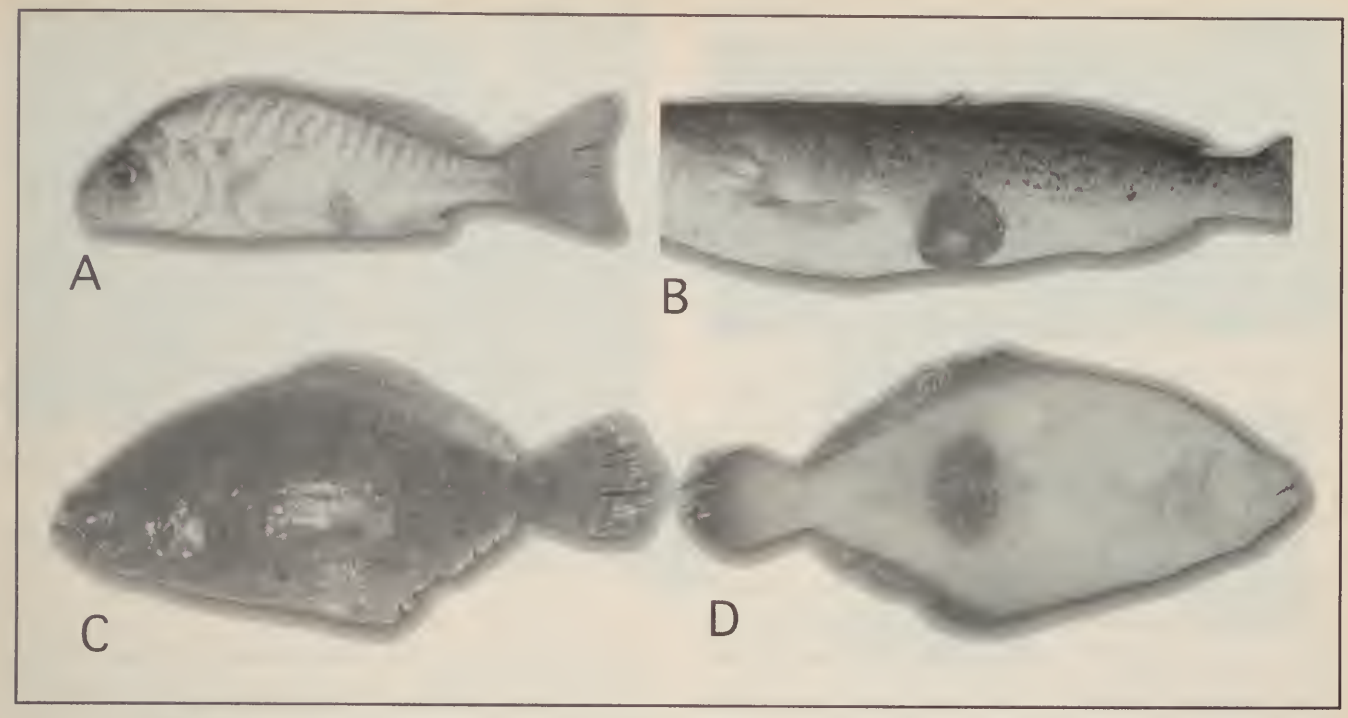

FIGURE 2. External lesions observed on (A) spot (*Leiostomus xanthurus*), (B) spotted sea trout (*Cynoscion nebulosus*), and (C and D) flounder (*Paralichthys* spp.) suspected to be associated with toxic dinoflagellates. The summer flounder lesion penetrates from the ventral surface of the fish (D) through the dorsal surface (C).

erate turbidity. Fish species collected during the Chicamacomico River sampling included striped bass (*Morone saxatilis*), yellow perch (*Perca flavescens*), Atlantic menhaden (*Brevoortia tyrannus*), channel catfish (*Ictalurus punctatus*), carp (*Cyprinus carpio*), and bluegill (*Lepomis macrochirus*). Additional samples were obtained from Kings Creek and the Pocomoke River. Skin scrapes and gill biopsies for parasites from representative specimens were negative. No gross lesions were noted on the yellow perch (n=3), channel catfish (n=1), carp (n=1), or bluegill (n=5). The striped bass specimen (n=1) had an annular reddening on the dorsum, circumscribing the base of the dorsal fin. External lesions were present on most of the menhaden (n=22). Several of the menhaden were weak or moribund at the time of capture. Solitary lesions on menhaden were noted on the ventrum, around the vent, on the side of the abdomen, on the dorsum, or on the caudal peduncle (**Figure 1**). The gross lesions consisted of focal erythema (**Figure 1A**), well-circumscribed ulcers with necrotic centers (**Figure 1B-E**), or round, raised, friable red nodules (**Figure 1F**). There was a similar presentation of ulcerative lesions on other species examined (**Figure 2**).

Microscopic examination of these ulcerative lesions demonstrated a marked chronic inflammatory infiltrate in large areas of exposed necrotic muscle (**Figures 3 and 4**). At the margins of the ulcer where the epithelium, dermis, and scales were still present, the inflammation extended into these layers and along fascial planes into the underlying musculature. In some fish the lesions extended to the backbone and into the peritoneal cavity. In these cases there was an extensive peritonitis surrounding the abdominal organs. Most fish had granulomata present in the necrotic tissue. Fungal hyphae were present in these granulomata (**Figure 5**). Gram-negative rod-shaped bacteria were also observed in the lesions, a common finding in ulcers of aquatic organisms.

Discussion

The gross lesions observed on menhaden collected from the Chicamacomico River are consistent with lesions previously described from fish collected from other environmental kills.[11,12] Although there was a prevalence of lesions near the anus, the location of lesions on the fish was variable. The extent of the lesions ranged from an area of reddening to deep penetrating ulcers (**Figure 1**). The annular lesion at the base of the dorsal fin noted on the striped bass in the present study appeared similar to lesions observed on *Pfiesteria*-exposed hybrid striped bass (*M. saxatilis* x *M. chrysops*) as described by Burkholder et al.[3]

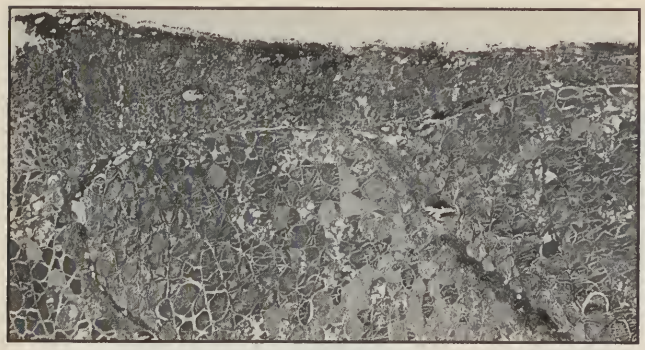

FIGURE 3. Large ulcerative lesion showing loss of epidermis, dermis, and subcutaneous tissue. There is necrotic debris at the surface of the lesion. A chronic inflammatory infiltrate can be seen extending along the fascial planes (dark bands). Many myosites are fragmented and necrotic. x80 HE

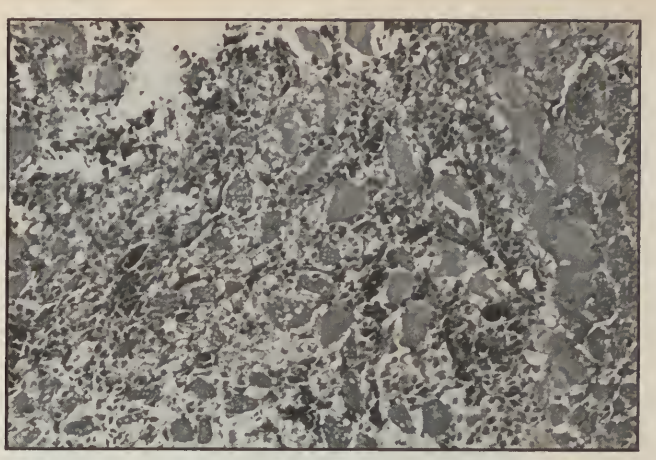

FIGURE 4. Photomicrograph of the chronic infiltrate surrounding the degenerating muscle fibers. The infiltrate is comprised primarily of lymphocytes, macrophages and occasional giant cells. There is substantial edema in this lesion, which is due to osmotic effects of water on exposed muscle. x400 HE

Limited laboratory experiments with striped bass exposed to a sublethal concentration of *Pfiesteria* toxin demonstrated chronic ulcer initiation.[13] So far, however, there has been no field validation to definitively demonstrate ulcerative lesion initiation due to exposure to toxic dinoflagellates.

It is interesting to note the diversity of fish taken during our low-salinity Chicamacomico sampling efforts. In addition to relatively salinity-tolerant menhaden, striped bass, and channel catfish, we also sampled freshwater species: yellow perch, carp, and bluegill. The portion of the Chicamacomico River that was sampled is tidal, with a salinity ranging from 0.5 to 9.5 ppt. (H. Speir, personal communications, 1998). This explains the species diversity that was observed. This is also the range of salinity that tends to accompany *Pfiesteria*-related fish mortality and lesions as seen in Maryland. Burkholder et al.[3] observed that while *Pfiesteria* tolerates salinities between 0 and 35 ppt, an optimal salinity for *Pfiesteria* growth and toxin production occurs at 15 ppt. To date, as least three potentially toxic *Pfiesteria*-like dinoflagellates (*P. piscicida, Gyrodinium galatheanum, Cryptoperidiniopsis* spp.) have been identified from the Chicamacomico River in 1997 (J.H. Landsberg, K.A. Steidinger, personal communications).

Ulcerative lesions in wild fish are often a primary or secondary consequence of bacterial, viral, or fungal pathogens, or parasites. Examples of biologic agents that are known to cause or be associated with primary or secondary ulcerative or hemorrhagic lesions, morbidity, and mortality, other than toxic dinoflagellates, include *Hemophilus piscum, Aeromonas hydrophila, A. salmonicida, Pseudomonas fluorescens, Flexibacter* spp., *Vibrio anguillarum, Edwardsiella tarda* (bacteria); *Ichthyosporidium hoferi, Aphanomyces* spp., *Saprolegnia* spp. (fungi); *Glugea* (microsporidian protozoan), *Henneguya* spp. and *Myxobolus* spp. (myxosporidean protozoans), *Argulus* spp. and *Lernea elegans* (arthropod parasites), and *Petromyzon* spp. (vertebrate parasites).[14-16] Some examples of lesions from Chesapeake Bay fish, not associated with toxic dinoflagellates, are shown in **Figure 6**.

Although several opportunistic pathogenic bacterial species have been isolated from Chesapeake Bay menhaden lesions, fungal involvement appears universal. In fact, these ulcerative lesions have been associated with the term ulcerative mycosis.[12,13] Commonly, these ulcers involve at least two genera of fungi: *Aphanomyces* and *Saprolegnia*.[12,13] Noga and Dykstra[13] hypothesized that lesion progression begins as small flat red areas which lead to scale and skin loss, exposing muscle, or raised masses with a necrotic core which then sloughs off, leaving a crater-shaped cavity. Osmotic stress due to

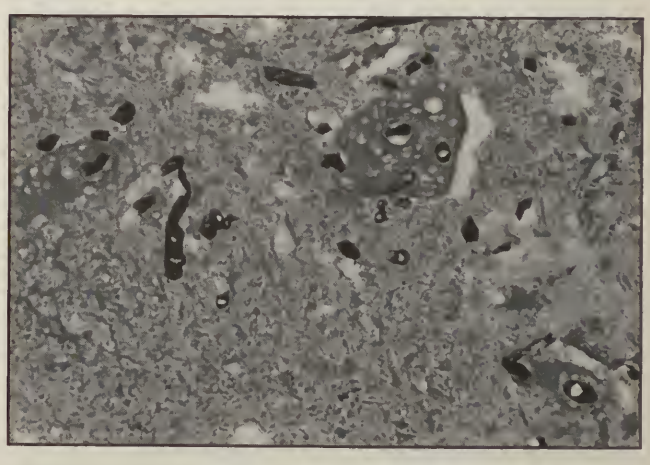

FIGURE 5. Photomicrograph of granulomata located in a section of necrotic muscle. Note the numerous fungal hyphae within the granulomata and in the adjacent necrotic debris. x400 HE

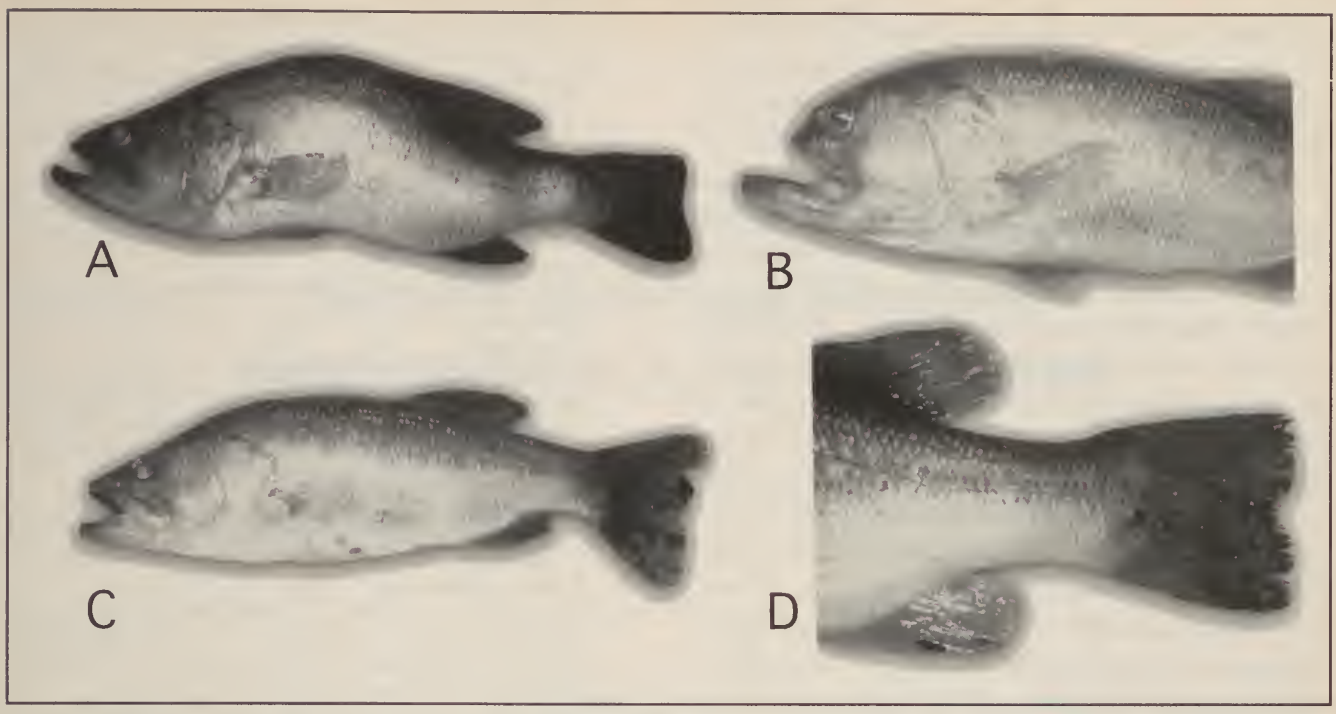

FIGURE 6. Examples of fish lesions on largemouth bass not associated with exposure to toxic dinoflagellates. (A and B) skeletal deformities: lordosis and brachygnathia, respectively, which may have been genetic or caused by nutritional deficiency or parasites, (C) two relatively shallow, small ulcers beneath the left pectoral fin, and (D) parasitism (leech) on the anal fin and erosion at the posterior edge of the caudal fin. Small skin abrasions, erosions, or ulcers are not uncommon in wild fish and are often non-specific in origin. These types of lesions may be associated with changes in water temperature, spawning, parasitism, trauma, or poor water quality. These fish were collected during a fish health survey in northern Chesapeake Bay.

these open lesions contributes to loss of ionic homeostasis and death.[17]

Lesions associated with ulcerative mycosis are chronic, and are not induced at the time of an acute fish kill. Although the pathogenesis of these ulcerative lesions remains unclear, it is likely that some type of initial injury to the epidermis fosters subsequent invasion by opportunistic pathogens (as described above). Such injury may be caused by trauma, pathogens, parasites, or possibly sublethal exposure to dinoflagellate toxin(s).

Based on the current literature, Atlantic menhaden appear to be most susceptible to the exposure effects of *Pfiesteria*-like organisms (and/or its toxins). However, other fish species have been shown to be affected, with or without gross pathology (**Table 2**). In general, menhaden are highly sensitive to most types of environmental stressors (biologic, chemical, and physical). Species, such as killifish (*Fundulus heteroclitus*) and hogchoker (*Trinectes maculatus*), on the other hand, tend to be relatively resistant to stress. The biologic reason(s) for these consistent disparities in susceptibility to stress remains unclear, but based on their mass mortalities, menhaden are currently the best biologic indicator of toxic *Pfiesteria*-like dinoflagellate blooms and envi-

TABLE 2. Chesapeake Bay region fish species known to be affected by exposure to *Pfiesteria*-like dinoflagellates or their toxin(s). Compiled from Lewitus et al.,[2] Burkholder et al.,[3] Noga et al.[17] and Terlizzi.[25]

American eel (*Anguilla rostrata*)
Atlantic croaker (*Micropogonias undulatus*)
Atlantic menhaden (*Brevoortia tyrannus*)
channel catfish (*Ictalurus punctatus*)
goldfish (*Carassius auratus*)
hogchoker (*Trinectes maculatus*)
killifish (*Fundulus heteroclitus*)
largemouth bass (*Micropterus salmoides*)
mosquitofish (*Gambusia affinis*)
naked goby (*Gobiosoma bosc*)
pinfish (*Lagodon rhomboides*)
red drum (*Sciaenops ocellatus*)
redear sunfish (*Lepomis microlophys*)
sheepshead (*Archosargus probatocephalus*)
Southern flounder (*Paralichthys lethostigma*)
spot (*Leiostomus xanthurus*)
spotted sea trout (*Cynoscion nebulosus*)
striped bass (*Morone saxatilis*)
striped bass hybrids (*Morone saxatilis* x *M. chrysops*)
striped mullet (*Mugil cephalus*)
white perch (*Morone americana*)

ronmental stress. The presence of potentially harmful toxic dinoflagellates, however, must be definitely confirmed by electron microscopic species-level identification and light microscopic cell density estimates.[3,5,18]

To date, there is no evidence that live fish with lesions harbor *Pfiesteria*-like organisms or their toxin(s). Further, there are no current data to support that these fish lesions are a source of infection for human dermal pathologies (as described by Shoemaker[19] and Lowitt[20]). From a more general perspective, however, whole (healthy) fish have been known to cause acute contact dermatitis and asthma-like symptoms in humans.[21,22] It appears that some human hypersensitivity reactions may be related to a glycoprotein component of the outer protective mucus coat covering fish epithelium.[23,24]

In general, observations of ulcerative fish lesions in many different waterways worldwide, has appeared to increase over the last half century.[14] Although multiple etiologies are likely involved, increased incidence of fish mortalities and lesions is indicative of an increase in environmental stress. These environmental stressors include pollution, non–point- source contamination, and nutrient enrichment, all of which foster accelerated eutrophication of aquatic systems. These issues are obviously complex, and multidisciplinary efforts are needed to better understand the elaborate relationships between the biotic and abiotic components of our aquatic systems. Additional information about fish health may be obtained from the Fish Health in Chesapeake Bay worldwide web site (http://www.mdsg.umd.edu/fish-health).

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References

1. Burkholder JM, Glasgow HB. Trophic controls on stage transformations of a toxic ambush-predator dinoflagellate. *J Euk Microbiol* 1997;44:200–205.
2. Lewitus AJ, Jesien RV, Kana TM, et al. Discovery of the "phantom" dinoflagellate in Chesapeake Bay. *Estuaries* 1995;18:373–378.
3. Burkholder JM, Glasgow HB, Hobbs CW. Fish kills linked to a toxic ambush-predator dinoflagellate: distribution and environmental conditions. *Mar Ecol Prog Ser* 1995;124:43–61.
4. Matuszak DL, Sanders M, Taylor JL, Wasserman MP. Toxic *Pfiesteria* and human health. *Md Med J* 1997;46:515–520.
5. Steidinger KA, Burkholder JM, Glasgow HB, et al. *Pfiesteria piscicida* gen. Et sp. Nov. (Pfiesteriaccae fam. Nov.), a new toxic dinoflagellate with a complex life cycle and behavior. *J Phycol* 1996;32:157–164.
6. Pfiester LA, Popovsky J. Parasitic, amoeboid dinoflagellates. *Nature* 1979;279:421–424.
7. Steidinger, KA. Some taxonomic and biologic aspects of toxic dinoflagellates. In: I.R. Falconer (ed). *Algal Toxins in Seafood and Drinking Water.* London: Academic Press, 1993.
8. WHO 1984. Aquatic (Marine and Freshwater) Biotoxins. Environmental Health Criteria 37. Geneva: World Health Organization.
9. Abbott, BC, Siger, A, Spiegelstein, M. Toxins from the blooms of *Gymnodinium breve*. In: LoCierco VR (ed). *Proceedings of the First International Conference on Toxic Dinoflagellate Blooms*, Wakefield, MA, Massachusetts Science and Technology Foundation, pp. 335–363.
10. Profet, EB, Mills, B, Arrington, JB,. Sobin, LH. 1992 Laboratory Methods in Histotechnology. Armed Forces Institute of Pathology, Washington, D.C., Washington: American Registry of Pathology.
11. Ahrenholz DW, Guthrie JF, Clayton RM. Observations of ulcerative mycosis infections on atlantic menhaden (*Brevoortia tyrannus*). *NOAA Technical Memorandum, NMFS-SEFC-196* June 1987.
12. Dykstra MJ, Levine JF, Noga EJ, et al. Ulcerative mycosis: a serious menhaden disease of the southeastern coastal fisheries of the United States. *J Fish Dis* 1989;12:175–178.
13. Noga EJ, Dykstra MJ. Oomycete fungi associated with ulcerative mycosis in menhaden, *Brevoortia tyrannus* (Latrobe). *J Fish Dis* 1986;9:47–53.
14. Sinderman, CJ. Epizootic ulcerative syndromes in coastal/ estuarine fish. NOAA Technical Memorandum NMFS-F/ NEC-54, June 1988.
15. Ferguson, HW. *Systematic Pathology of Fish.* Ames, Iowa: Iowa State University Press.
16. Roberts, RJ. *Fish Pathology.* 2nd. Ed. Bailliere Tindall. London, England, 1989.
17. Noga, EJ, Khoo L, Stevens JB, et al. Novel toxic dinoflagellate causes epidemic disease in estuarine fish. *Mar Pollut Bull* 1996;32:219–224.
18. MMWR (Morbidity and Mortality Weekly Report). Results of the public health response to Pfiesteria Workshop- Atlanta Georgia, September 29-30, 1997.
19. Shoemaker RC. Diagnosis of *Pfiesteria*-human illness syndrome. *Md Med J* 1997;46:521–523.
20. Lowitt MH, Kauffman LC. *Pfiesteria* and the skin: a practical update for the clinician. *Md Med J* 1998; 47:124–126.
21. Alonso MD, Davila I, Conde Salazar L, et al. Occupational protein contact dermatitis from herring. *Allergy* 1993;48: 349–352.
22. Dominguez C, Ojeda I, Crespo JF, et al. Allergic reactions following skin contact with fish. *Allergy Asthma Proc* 1996;17:83–87.
23. Chiou, FY, Tschen, JA. Fish scale-induced dermatitis. *J Am Acad Dermatol* 1993;28:962–965.
24. Warpinski JR, Folgert J, Voss M, Bush RK. Fish surface mucin hypersensitivity. *J Wilderness Med* 1993;4:261–269.
25. Terlizzi D. Fish kills and harmful algal blooms. *Maryland Aquafarmer* 1997, Fall:1-2. ■

Strategies for environmental monitoring of toxin producing phantom dinoflagellates in the Chesapeake

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ABSTRACT: *Toxin-producing estuarine dinoflagellates have been linked with the occurrence of fish kills and the development of a novel clinical illness syndrome among persons exposed to waters during fish kill events. The prototype organism of this group,* Pfiesteria piscicida, *has an extremely complex life cycle, making traditional methods used for environmental monitoring of harmful algal blooms less reliable. The response to fish kill events and the occurrence of human illness in Maryland in 1997 is reviewed, with particular emphasis on problems in organism detection. Current and anticipated classical and molecular methodologies for the detection of* Pfiesteria *and* Pfiesteria*-like organisms are reviewed. Development of these capabilities will be of critical importance in defining the epidemiology of human illness related to environmental exposure to* Pfiesteria, *and in developing public health strategies to predict and prevent such illness.*

Red tides causing shellfish toxicity and fish death have been recognized for centuries. Such plankton blooms, often but not always indicated by dramatic changes in water color and quality, may induce deleterious environmental effects through a variety of mechanisms including diminished dissolved oxygen content of affected waters and for some species, the direct effects of toxins. These harmful algal blooms (HAB) appear to be occurring worldwide with increasing frequency during this century, a change attributed in part to global warming and other ecologic disturbances associated with the increasing human population.[1,2,3] Humans, in turn, are directly affected in several distinct clinical syndromes associated with certain algal blooms, including paralytic shellfish poisoning, neuro-

TABLE 1. Public health strategies for prevention of recognized dinoflagellate toxin associated diseases

Clinical Syndrome	Organisms	Toxins	Exposure Vehicle	Public Health Response
Paralytic shellfish poisoning	*Alexandrium* spp. *and related organisms*	Saxitoxins	Consumption of bioaccumulated toxins in shellfish.	Phytoplankton monitoring (*Alexandrium* is a large, and distinctive dinoflagellate). Shellfish bed closures based on mouse bioassay for saxitoxins in shellfish.
Amnesic shellfish poisoning	*Pseudonitzschia* spp.	Domoic acid	Consumption of bioaccumulated toxins in shellfish, particularly mussels.	Phytoplankton and shellfish domoic acid content monitoring by HPLC. (Difficult to distinguish toxic from non-toxic diatoms).
Neurotoxic shellfish poisoning	*Gymnodinium breve*	Brevetoxins	a) Consumption of bioaccumulated toxins. b) Inhalation of toxin-containing aerosols generated by wave and wind action.	Phytoplankton monitoring. Shellfish bed (and beachfronts, for on-shore blooms) closure based on counts (>5000 cells/L=closure).
Ciguatera fish poisoning	Benthic coral reef dinoflagellate species (*Gambierdiscus toxicus, Prorocentrum* spp., *Amphidinium carterae*, others)	Ciguatoxins/ Maitotoxins	Consumption of bioaccumulated toxins in tropical reef fish, in particular predators such as barracuda, grouper, snapper.	No feasible method currently available for screening of individual fish. Toxins are heat stable. Common sense measures (avoid consumption of high-risk fish species from high-risk locales).

toxic shellfish poisoning, and amnesic shellfish poisoning.[4] Resultant public health measures developed to attempt to predict and prevent such illnesses are presented in **Table 1**. Recently, a new dinoflagellate-associated human illness was described among persons exposed to Chesapeake Bay waters during fish kill events attributed to a novel heterotrophic dinoflagellate, *Pfiesteria piscicida*.[5] It is considered likely that such events will recur. Therefore, significant efforts are underway to validate the initial clinical observations and to develop means to predict and prevent such illness. However, the unique biology of *Pfiesteria* and *Pfiesteria*-like estuarine heterotrophic dinoflagellates presents considerable obstacles in this regard. An overview of current and potential strategies to overcome those obstacles is presented.

Pfiesteria piscicida

Pfiesteria piscicida, the prototype toxin-producing phantom dinoflagellate associated with human illness, was first observed as a laboratory aquarium contaminant, and later discovered in waters of the Pamlico and Neuse estuaries of North Carolina in 1991.[6,7] Subsequent studies confirmed *Pfiesteria*'s ability to produce potent toxins capable of killing fish, and field research linked the organism to many major fish kills occurring in North Carolina's estuarine waters.[6-9] *Pfiesteria* blooms inducing fish kills were often ephemeral, and the causative organism could be missed altogether if water sampling was not done in a timely fashion.[6] As the complex life cycle of *Pfiesteria* was dissected, the explanation for these difficulties became more apparent. *Pfiesteria*, and other poorly characterized heterotrophic estuarine dinoflagellate species, may persist in cysts in bottom sediments or dwell there in amoeboid forms. Under appropriate environmental conditions including optimal salinity, temperature, and nutrient load, increasing numbers of organisms are found in the water column as free-swimming amoebae or flagellated zoospores. If the proper constellation of circumstances occurs, apparently including the presence of appropriate prey species (fish), the organism may be induced to produce toxin and multiply rapidly, presumptively exploiting the dead and injured fish food

source. Just as rapidly, however, the organism can drop out of the water column back to the water sediment interface, making their detection difficult (thus their characterization as phantom dinoflagellates). The significance of this ecologic strategy in the overall trophic behavior of *Pfiesteria* has not been fully characterized, but it has been suggested that this may be a significant although previously unrecognized factor in estuarine food webs.[9]

Pfiesteria-like toxin-producing dinoflagellates

Throughout this article, the genus name *Pfiesteria* is utilized generically to refer to newly identified toxin-producing heterotrophic dinoflagellate species of U.S. Atlantic estuarine waters associated with fish kills. Several laboratories have isolated dinoflagellates distinct from *P. piscicida* from Chesapeake Bay waters at times of fish kills. In the laboratory, some of these isolates demonstrate toxin production and fish killing capability; full characterization and publication of these findings by the respective investigators is pending. Two examples include the identification of a "shepherd's crook" dinoflagellate from the Pocomoke River, Maryland, during the summer of 1997 (*P. piscicida* was also present during this time) (K. Steidinger, personal communication), and the isolation of a peridiniopsoid dinoflagellate from multiple East Coast locations (P. Tester, personal communication). It is likely that other novel species will be identified, and significant effort will be required to determine the pathogenic significance of each for fish and human health. Obviously, this diversity will further complicate efforts to develop rapid assays to detect these toxic dinoflagellates or their metabolites (toxins), and it may also result in differing human clinical outcomes associated with fish kill exposures.

Pfiesteria toxins

The toxins produced by *Pfiesteria* and related organisms have not yet been fully characterized, but unpublished preliminary reports of isolation of both water-soluble and lipid-soluble toxin fractions have been made. Significant progress in this area is needed and is anticipated. Several features are noteworthy. First, the toxin(s) appears to be exotoxins directly secreted into the environment. This makes sense if fish predation is indeed an ecologic strategy of the organism, but it is novel among known dinoflagellate toxins inducing human disease. Second, although the environmental half-life of secreted toxin(s) is not known, the empirical observation has been made that active-*Pfiesteria* culture water loses its toxic potential relatively rapidly (J. Burkholder, personal communication). It is not known if this is due to toxin instability, cleavage, nonspecific binding to water solutes and solids, or alternative mechanisms. Third, the toxin(s) is extremely potent, with unique toxin(s) or toxin fractions inducing fish lesions and/or neurotoxicity and death at extremely low concentrations (J. Ramsdale, personal communication). Intraperitoneal injection of filtered (toxin-containing) water specimens from active (*Pfiesteria*) fish killing cultures into rats results in maze-learning deficits.[10] Finally, and most importantly, presumptive exposure to *Pfiesteria* toxin(s) has been associated with novel human illness, as described previously[5,11] and in other reports in this issue of the *Maryland Medical Journal.*

Additionally, the possibility must be considered that toxins elaborated by *Pfiesteria* and related organisms may be produced by endosymbiotic or dinoflagellate-associated bacterial strains, as was recently demonstrated for saxitoxin production in *Alexandrium* cultures.[12] Although exclusive production of toxin by the associated bacterial species was not demonstrated in that case, the ability of the bacteria to produce saxitoxins was unequivocally demonstrated. Should such relationships be present in *Pfiesteria* species, it may further complicate efforts to define the parameters associated with toxin production and to characterize those toxins.

Epidemiologic considerations

Epidemiologic data gathered thus far implicate exposure to *Pfiesteria*-affected waters (and not consumption of seafood) with the occurrence of human disease. Certainly, experience with other dinoflagellate–toxin–induced human diseases mandates a thorough evaluation of possible toxin bioaccumulation in fish or shellfish (such as occurs with ciguatera, paralytic shellfish poisoning, diarrheic shellfish poisoning, etc.). However, at present, no epidemiologic evidence exists supporting the hypothesis that humans develop *Pfiesteria*-related clinical illness through food consumption. As specific assays for the detection of toxin(s) become available, it will be possible to address this concern directly. To date, those persons with presumed *Pfiesteria*-related illness identified in Maryland have all had in common a significant exposure to waters with recognized *Pfiesteria* activity. The public health challenge is to define a significant exposure and to take steps to limit such exposures.

Fish monitoring

Maryland's public health effort to reduce significant exposures in 1997 has been described previously in this jour-

TABLE 2. Potential strategies for monitoring of *P. piscicida* and related toxin-producing heterotrophic dinoflagellate activity in Chesapeake Bay waters

Method	Advantages	Disadvantages
Fish kill monitoring	High public awareness, often dramatic events	Multiple etiologies for fish kills Event may be undetected Impossible to predict (currently)
Lesioned fish monitoring	May represent "average activity" in waterway Low technology approach	Multiple etiologies for lesions Lesions persist over time Fish don't stay in one place Very labor intensive
***Pfiesteria*-like dinoflagellate by light microscopy**	Provides immediate data about potential occurrence of *Pfiesteria* or other dinoflagellate blooms. Can be performed by trained microscopists	No species identification Does not distinguish toxic from nontoxic organisms
Fish-kill bioassay	Demonstrates unequivocally that organisms present in sampled water had potential to kill fish, presumably through toxin elaboration	Expensive, time consuming, laborious, lab biohazard No species identification
Scanning electron microscopy	Standard method for taxonomic classification	Most expensive, most laborious Requires relatively pure culture of organisms
Monoclonal antibody staining	Fast, easy, can be highly specific Compatible with automated cell counters Compatible with ELISA format Can be quantitative	Antibodies don't presently exist Multiple organism stages (common antigen for all?) Specificity? Can't distinguish toxic/nontoxic
Oligonucleotide hybridization (in situ hybridization)	Can be highly specific and quantitative Compatible with automated cell counters Compatible with ELISA format	Requires specific sequence data (just now becoming available) Can't distinguish toxic/nontoxic Must deliver probe across cell wall
PCR-based Strategies (DNA detection)	Steady advances in technology Increasing speed and throughput capacity Highly specific Can be quantitative	Requires specific sequence data Environmental samples often have significant PCR inhibitors Sample preparation significant Won't distinguish toxic/nontoxic
RT-PCR based strategies (RNA detection)	Same as above If genes associated with toxin production are targeted, may be able to detect organisms in "toxin-production" mode.	Requires specific sequence data Sample preparation more difficult RNA easily degraded Presence of PCR inhibitors
Toxin assays	If reliable assays are produced, can measure specific factors associated with human disease.	Assays are under development. Environmental half-life of toxin unknown.

nal.[13] The program relied primarily upon the observation of fish kills or fish with lesions considered characteristic of *Pfiesteria*-related injury in the absence of alternative explanations. In some cases, laboratory identification of *P. piscicida* was accomplished in a time frame that supported these efforts, but fish disease remained the primary marker. Acute and ongoing fish kill events, if due to *Pfiesteria*-like dinoflagellates, are almost certainly the highest risk exposure settings for humans, for it is at such times, in general, that the greatest number of toxin-producing organisms are detected in water samples. Recognizing and responding to such events is highly warranted. However, there are many causes of fish kills and ulceration.[14-16] Although a fairly characteristic lesion that is presumptively associated with *Pfiesteria* exposure has been described in Atlantic menhaden (*Brevoortia tyrannus*), no specific assay for *Pfiesteria*-induced lesions has been developed. Therefore, the development of specific assays for the identifi-

cation of toxin-producing dinoflagellates or their toxins is critical.

Chronic toxin-producing activity of *Pfiesteria*-like dinoflagellates in estuarine waters is even more difficult to gauge, and the human health implications are less clear. In Maryland during 1997, monitoring of fish with ulceration (in addition to responding to outright fish kills) guided responses. However, the lesions are persistent, the fish move from location to location, and the specificity of lesions is uncertain. These very problems, however, may make fish health monitoring in a particular waterway the best current method to estimate the overall *Pfiesteria*-like dinoflagellate toxin production in that area. The fish in their movements sample many areas, and carry the lesions through time and space, awaiting sampling nets. Thus, Atlantic menhaden (and other species) may serve as bioindicators (Chesapeake canaries) of overall *Pfiesteria* activity. However, it should be made clear that the predictive value of lesioned fish monitoring as a marker for potential toxin exposure has never been tested, although preliminary data suggest that it may be a useful strategy. Finally, obtaining adequate environmental fish sample data is laborious, time consuming, expensive, and difficult to accomplish over wide geographic areas.

Direct detection of *Pfiesteria* by microscopy

Pfiesteria is a polymorphic organism with benthic and planktonic amoeboid forms (size range: 1 to 450 μm), small flagellated zoospores (size range: 8 to 14 μm), sexual reproductive forms (gametes, size range 5 to 10 μm), and resting cyst stages (size range: 5 to 10 μm)[6,8,9] (**Figures 1 and 2**). Toxin production has been attributed to several of these life stages, including amoeboid and flagellated forms.[6,9] Although the organism cannot be definitively diagnosed by light microscopy alone, experienced biologists can identify and quantify organisms with morphology consistent with *Pfiesteria*. During evaluation of acute fish kill events in Maryland waters in 1997, this was the first analysis performed in reference laboratories to which water specimens were sent. Typical counts of *Pfiesteria*-like cells collected in Maryland waters at such times ranged from 0 to 900 cells/ml (J. Burkholder, personal communications).

The second stage in evaluation of water specimens from suspected *Pfiesteria*-related fish kill events has been to perform bioassays for the production of toxin by cultured organisms. Dinoflagellates are grown in culture, in the presence of live fish; if fish death or lesioning ensues, it is presumed that the same event was occurring in the sampled waters. In general, a positive fish-kill bioassay confirms the presence of toxin-producing dinoflagellates (with caveats), but this does not identify dinoflagellate species.

The third stage in evaluation of water specimens is to perform definitive morphologic/taxonomic assessment. Dinoflagellate speciation is determined by observing the particular number and arrangement of thecal plates encasing the organism and relating this information to observations of the organisms' life cycle. These observations, performed by scanning electron microscopy, are particularly laborious and require extraordinary expertise.

FIGURE 1. Lobose amoebid form of *Pfiesteria piscicida* (approx. 40 μm) under differential interference contrast microscopy. Note engulfed cryptomonad in food vacuole on right end of cell.

FIGURE 2. Star amoeba form of *Pfiesteria piscicida*.

Detection of labeled *Pfiesteria*: immunologic methods

The above staged evaluation was the standard in 1997 for the work-up of a water sample from a suspected *Pfiesteria*-related fish kill. What options exist for improvement in the future? Specific biochemical or immunologic reagents may be used to label organisms and permit their specific identification. For example, it has been suggested that tagged lectin-binding proteins might be used to label harmful algae, and that this approach could be adapted for *Pfiesteria* (G. Vista, personal communication). An alternative approach is the development of monoclonal antibodies to cell surface epitopes of *Pfiesteria*. Such an approach would make possible high throughput cell counting in 96-well plate ELISA format (as has been accomplished with *Alexandrium)*.[17] Use of fluorescence-tagged monoclonals would allow activated cell sorting and counting. However, such antibodies are not

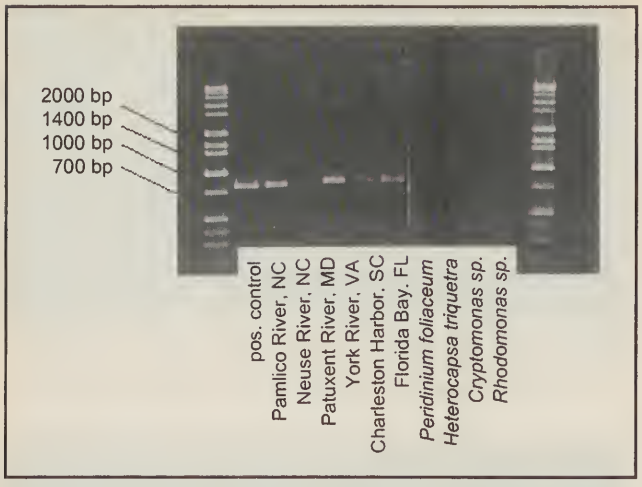

FIGURE 3. Gel electrophoresis visualization of PCR amplification products of *P. piscicida* culture isolates with *Pfiesteria*-specific primers. Two other dinoflagellates and two cryptomonad algal species (lanes on right) show no amplification.

presently available. Candidate monoclonals would ideally detect all toxin-producing stages of *Pfiesteria*, and have demonstrated specificity, which may be difficult to accomplish. In addition, it is important to note that *Pfiesteria* may compose less than 10 percent of the total phytoplankton community, even during fish kill events. This may present difficulties in detection for many labeling methods, particularly if cross-reactivity is an issue, since nontarget organisms could heavily overshadow target organisms.

Successful application of anticipated *Pfiesteria*-specific reagents such as monoclonal antibodies may also be limited if those reagents are unable to distinguish toxic from nontoxic organisms. However, the ability to detect and quantify *Pfiesteria* in water samples would be a significant improvement over current methods, and may have value as a tool to estimate the likelihood of subsequent toxin production, fish kill events, and potential human health hazards.

Nucleic acid-based strategies

Specific nucleic acid sequence detection, achieved with a variety of now routine assays such as the polymerase chain reaction (PCR), ligase chain reaction, and *in situ* hybridization, is used routinely for detection of microbes pathogenic to humans, both *in vivo* and in environmental settings. For specific diagnostic assays, this approach requires knowledge of target genes or their transcribed products that are unique to the species or strain in question. In some cases where there is differential gene expression, it may be possible to detect specific life cycle stages (or toxin production). Small subunit ribosomal DNA or RNA (SSU rDNA, SSU mRNA) sequences are one potential target for PCR based assays, due to the extensive databases that currently exist for these genes (i.e., GenBank, RDP)[18] and the insights into phylogenetic relationships such sequence data may provide.[19,20]

There are significant challenges to PCR based approaches, however, especially in organisms such as *Pfiesteria* with complex life cycles. At present, the primary impediment is the requirement for specific target gene sequences. Grown in mixed cultures, both prey and contaminating species DNA are present, and as well, the organism may contain non-*Pfiesteria* nucleic acids in the form of endosymbionts and prey in food vacuoles. After laboratory development of PCR-based assays, there must be extensive field-testing, as there may be cross-reactions with additional, as yet unknown, species in the natural environment. In addition, there are critical sample preparation issues. Extraction of DNA from dinoflagellates with rigid cell walls (thecal plates) is sometimes problematic, and environmental samples (water and sediment) often contain contaminating substances that can inhibit PCR reactions. Finally, regarding stage-specific organism detection, if toxins are products of complex metabolic pathways (and possibly even endosymbiont metabolic pathways) rather than direct gene products, as may be the case with *P. piscicida*, prospects for PCR-based assays to distinguish toxic from nontoxic forms are dim.

With respect to *Pfiesteria*-like organisms, Rublee and colleagues have developed a candidate PCR assay for detection of *P. piscicida* in cultures,[21,22] as illustrated in **Figure 3**. The efficacy of this approach in field samples, where *P. piscicida* makes up a low percentage of total phytoplankton DNA even during fish kill events, remains to be demonstrated.

Genomic sequence data may also be used to generate specific oligonucleotide probes for use in *in situ* hybridization assays. If appropriate concentrations of specific probe can be delivered across the robust cell wall of *Pfiesteria,* detection of labeled cells in water samples could then be accomplished. In preliminary experiments performed in the laboratory of Rublee and colleagues, fluorescein-labeled oligonucleotide probes derived from cloned *Pfiesteria* 18s rRNA gene sequences[21] have been demonstrated to hybridize efficiently with cultured *Pfiesteria* organisms, allowing their detection by fluorescence microscopy. Such strategies may also be adapted for automated cell-counting techniques.

Toxin detection

As stated above, full characterization of the toxin(s) produced by *Pfiesteria* has not yet been reported. However, preliminary results in the development of assays for toxin activity have been reported at meetings and in abstract format. John Ramsdale and colleagues at the National Oceano-

graphic and Atmospheric Administration's Charleston Laboratory have described isolation of a water soluble toxic fraction (toxin) from active *Pfiesteria* cultures, and have developed an extremely sensitive pituitary cell line cFos reporter gene assay to measure toxin activity (J. Ramsdale, personal communications). The assay appears to be highly sensitive and specific for *Pfiesteria* toxins, although further assessment of assay specificity is underway (J. Ramsdale, personal communications). It is hoped that this reporter gene assay may be capable of detecting toxin within affected humans during acute illness, although this hypothesis has not been tested.

An alternative cellular cytotoxicity assay developed by McCallan-Green and colleagues may have utility in environmental field testing.[23] Water specimens from active (fish-killing) *Pfiesteria* cultures were filtered across an activated charcoal column, and putative toxins later eluted with appropriate buffers. Column eluates from active fish-killing cultures show a characteristic cytotoxicity (cytoplasmic membrane blebbing) when assayed against human neuroblastoma cell lines,[23] detectable at remarkable dilutions of the eluate (if confirmed, suggesting extraordinary specific activity for the toxin(s) fraction detected).

These assays, if demonstrated to have appropriate sensitivity and specificity, would be a significant advance, for they would test for the presence of the chemical compounds presumed to be directly responsible for human health effects. Identification of toxin metabolites may facilitate development of clinical (human medical) diagnostic assays for prior exposure (J. Ramsdale, personal communications). In addition, availability of specific toxin assays could complement direct organism detection in the evaluation of fish kill events.

Summary

Significant advances in the ability to detect *P. piscicida* and related organisms, and their metabolites, in estuarine waters are anticipated in the near future. These new capabilities will be of critical importance in defining the epidemiology of human illness related to environmental exposure to *Pfiesteria*, and in developing the means to predict and prevent such illness.

References

1. ECOHAB. The ecology and oceanography of harmful algal blooms: a national research agenda. Report of a workshop held at the Snow Mountain Ranch Conference Center, CO, August, 1994. Available at http://www.redtide.whoi.edu/hab/nationplan/ECOHAB.
2. Anderson DM. Red Tides. *Sci Am* 1994;Aug:62–68.
3. Tester PA. Harmful marine phytoplankton and shellfish toxicity. Potential consequences of climate change. *Ann NY Acad Sci* 1994;69–76.
4. Morris JG. Natural toxins associated with fish and shellfish. In: *Infections of the Gastrointestinal Tract.* Blaser MJ, Smith PD, Ravdin JI, et al. (eds). New York: Raven Press, 1995.
5. Grattan LM, Oldach DW, Perl TM, et al. Problems in learning and memory occur in personswith environmental exposure to waterways containing toxin-producing *Pfiesteria* or *Pfiesteria*-like dinoflagellates. (Under review).
6. Burkholder JM, Noga EJ, Hobbs CW, et al. New 'phantom' dinoflagellate is the causative agent of major estuarine fish kills. *Nature* 1992;358:407–410.
7. Noga EJ, Smith SA, Burkholder JM, et al. A new ichthyotoxic dinoflagellate: cause of acute mortality in aquarium fishes. *Vet Record* 1993;133:96–97.
8. Steidinger KA, Burkholder JM, Glasgow HB, et al. *Pfiesteria piscicida* gen.et sp. Nov. (Pfiesteriaceae, fam. Nov.), a new toxic dinoflagellate genus and species with a complex life cycle and behavior. *J Phycol* 1996;32:157–164.
9. Burkholder JM, Glasgow HB. Trophic controls on stage transformations of a toxic ambush-predator dinoflagellate. *J Euk Microbiol* 1997;44:200–205.
10. Levin ED, Schmechel DE, Burkholder JM, et al. Persisting learning deficits in rats after exposure to *Pfiesteria piscicida*. *Environ Health Perspect* 1997;105:2–10.
11. Glasgow HB, Burkholder JM, Schemechel DE, et al. Insidious effects of a toxic dinoflagellate onfish survival and human health. *J Toxicol Environ Health* 1995;46:501–522.
12. Gallacher S, Flynn KJ, Franco JM, et al. Evidence for production of paralytic shellfish toxins by bacteria associated with *Alexandrium* sp. (Dinophyta) in culture. *Appl Environ Microbiol* 1997;63:239–245.
13. Matuszak DL, Sanders M, Taylor JL, Wasserman MP. Toxic *Pfiesteria* and human health. *Md Med J* 1997;46:515–520.
14. Noga EJ, Dykstra MJ. Oomycete fungi associated with ulcerative mycosis in menhaden (Brevoortia tyranus) (Latrobe). *J Fish Dis* 1986;9:47–53.
15. Dyskstra MJ, Levine JF, Noga EJ, et al. Ulcerative mycosis: a serious menhaden disease of the southeastern coastal fish-series of the United States. *J Fish Dis* 1989;2:175–178.
16. Sinderman CJ. Epizootic ulcerative syndrome in coastal and estuarine fish. NOAA Technical Memorandum, 1988. NMFS-F/NEC-54.
17. Anderson DM. Presentation at *Pfiesteria* Research Symposium sponsored by the University of Maryland Center of Marine Biotechnology, Baltimore, MD. September, 1997.
18. Sogin ML. Amplification of ribosomal RNA genes for molecular evolution studies. In: *PCR protocols: Guide to Methods and Applications*. Innis MA, Gelfand DH, Sninksy JJ, White TJ (eds). San Diego: Academic Press, 1990: 307–314.
19. Sogin ML, Elwood HJ, Gunderson JH. Evolutionary diversity of eukaryotic small-subunit rRNA genes. *Proc Natl Acad Sci* 1986;83:1383–1387.
20. Sogin ML, Gunderson JH. Structural diversity of eukaryotic small subunit ribosomal RNAs: evolutionary implications. Endocytobiology III. *Ann NY Acad Sci* 1987;503:125–129.
21. Toffer KL, Schaefer EF, Glasgow HB, et al. Ribosomal DNA from the toxic dinoflagellate *Pfiesteria piscicida*. Harmful Microalgae. Regurera B, Blanco J, Fernandez ML, and Wyuatt T (eds.) Xunta de Galicia and UNESCO, 1998, in press.
22. Toffer KL, Schaefer EF, Kempton JW, et al. Ribosomal primers for the identification of the toxic dinoflagellate, *Pfiesteria piscicida*. Submitted for publication, 1998.
23. McCallan-Green PD, Noga E, Baden D, et al. Cytotoxicity of a putative toxin from the *Pfiesteria piscicida* dinoflagellate. *The Toxicologist* 1997;36:276. ■

Neurologic symptoms following *Pfiesteria* exposure: case report and literature review

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ABSTRACT: *Although the recently identified dinoflagellate,* Pfiesteria piscicida, *may have neurotoxic effects on humans, the precise nature of the neurologic symptoms associated with varying levels of exposure is unknown. Toward this end, we review the neurologic symptoms of three* Pfiesteria*-exposed laboratory workers reported to date and compare them to the evaluation of an exposed waterman from Maryland. The occupational exposure of a Maryland waterman appears to produce a mild, reversible encephalopathy which predominantly affects functions associated with the frontal and temporal lobes. A comprehensive neurologic examination is recommended for all* Pfiesteria piscicida *and morphologically related organism-exposed, symptomatic persons.*

Pfiesteria piscicida and morphologically related organisms (MRO) are newly described toxic dinoflagellates. *P. piscicida* was isolated in 1991 by Burkholder et al.[1] and subsequently other morphologically related dinoflagellates were described.[2] *Pfiesteria* has been shown to release exotoxins and is implicated as a cause of some fish kills in the estuarine waters of North Carolina[1] and other Atlantic coast states. Glasgow et al.[3] described illnesses in laboratory workers exposed to waters containing *Pfiesteria* in its toxic stages that suggested that *Pfiesteria* produced neurotoxins that could cause human disease by both skin contact and inhalation of aerosols. To our knowledge, these are the only cases reported in the literature to date. These extant data are summarized to provide the reader with the range of potential neurologic disturbance associated with *Pfiesteria* or MRO exposure. Following this review, we provide the findings of a detailed neurologic evaluation of a Maryland

waterman who was also presumably exposed to *Pfiesteria* or MROs while working in an affected waterway.

Literature review

Glasgow et al.[2] described three laboratory workers who were exposed to water containing *P. piscicida* toxin by skin and aerosol contact in a laboratory setting.

Case A. This person was chronically exposed both by skin contact and aerosol. He developed skin lesions, irritability, and difficulty concentrating, culminating in a state of confusion and disorientation. He complained of distal sensory paresthesias and difficulty walking because of proprioceptive problems. Neurologic examination showed decreased Achilles reflexes but was otherwise normal. Peripheral blood counts and serum chemistries were normal except for an elevated CPK. Heavy metal screen was normal. Lyme titer was negative. Electromyography and nerve conduction velocities were normal (but showed mild changes consistent with axonal neuropathy). Cerebrospinal fluid examination revealed elevated total protein and immunoglobulin (IgG) but no cells and no oligoclonal bands. Recovery took approximately two years.

Case B. This patient received several acute exposures to aerosolized water from aquaria containing *Pfiesteria* organisms. Acutely, he developed confusion with nausea. Chronically, he developed skin lesions, personality change, irritability, "loss of judgment, poor memory, impaired speech and language, and difficulty with spatial orientation while driving." Neurologic examination showed an abnormal mental status with irritability, decreased attention, decreased verbal fluency, impaired reading, and acalculia. Deep tendon reflexes were slightly pendular, and mild dysdiachokinesia, and "problems with heel-to-shin and finger-to-nose maneuvers" were noted. Peripheral blood cell counts and serum chemistry studies revealed only "moderate and variable elevations of [serum alanine aminotransferase] SGPT and borderline low serum phosphorus." A magnetic resonance image (MRI) scan of the brain showed only "minimal (borderline-significant) changes in the left hippocampus." No abnormality was found on fluoro-deoxyglucose positron emission tomographic (PET) scan of the brain. Electromyogram and nerve conduction velocities were normal as were visual and auditory-evoked responses. Neuropsychologic testing showed memory problems involving more verbal than visual modalities. Neuropsychologic abnormalities improved in two months but the individual continued to complain of symptoms for more than a year.

Case C. This person had low-level chronic exposure as well as one acute exposure. During the acute exposure she developed headache, burning eyes, nausea with stomach cramping, disorientation, confusion, and "depersonalization." Neither neurologic examination nor laboratory evaluation was reported for this individual. Short-term memory problems followed and persisted for over a week; exercise-induced symptoms persisted for more than two years.

Since few suspected cases have been described in peer-reviewed publications, little guidance is available regarding the appropriate neurologic evaluation when the disorder is suspected. Following is a case review of an exposed symptomatic individual we evaluated.

Case report

A waterman in his 40s (Case 012), who had no previous significant illnesses, presented with a one-month history of confusion and memory disturbance after exposure to waters from the Pocomoke River during a period of documented fish kills and *Pfiesteria* infestation in the spring and summer of 1997. The onset of symptoms was insidious over a one- to two-week period and was associated with some shortness of breath and chest tightness that resolved. The patient had no headaches, nausea, abdominal pain, paresthesias, fevers, or constitutional symptoms. The patient noted difficulty in following conversations, driving to familiar places, and managing the finances of his business. The patient denied any history of alcohol, tobacco, or drug use. The patient's medical history revealed only a left foot fracture several years ago. Approximately three weeks after symptom onset the patient underwent a general medical examination and neuropsychologic testing.

The general medical examination was normal. Neuropsychologic testing showed severe memory impairment. Findings indicated difficulties with immediate and delayed recall for both verbal and visual information as the patient consistently scored below the second percentile compared to other persons of his age, education, and occupational level on these standard tests. Performance on measures of selective and divided attention were also markedly abnormal. In addition, psychomotor speed and dexterity were compromised bilaterally, and difficulties were detectable on a task of clerical speed and accuracy. In contrast, performance on measures of simple attention, concentration, constructional praxis, verbal fluency, naming, reading, and visual perceptual abilities were all normal. Additional mental status testing was carried out approximately six weeks after symptom onset within the context of a complete neurologic examination. On mental status testing the patient was

alert and fully oriented and his affect was appropriate. Attention (digit span and serial sevens) was normal and he recalled three objects at five minutes. His remote memory was normal. Calculations and language function were normal. Cranial nerve testing showed decreased smell in the right nostril. Visual and auditory function were normal. Facial strength and sensation were normal. Other cranial nerves were normal. Motor testing revealed normal tone, bulk, and strength. Reflex testing revealed normal deep tendon reflexes and no Babinski's sign but a positive palmar-mental reflex on the left and a positive globellar reflex. Sensation was normal throughout. Coordination testing showed a slight dysmetria on finger-nose-finger testing on the left. Gait and station were normal. MRI scan of the brain and electroencephalogram were normal. Reevaluation approximately three months after the onset of symptoms showed symptomatic improvement and marked improvement on most neuropsychologic tests. Mild memory problems persisted.

Discussion

Neurologic and neuropsychologic evaluation of the patient (Case 012) supports the presence of a mild, reversible encephalopathy after exposure to waters containing *P. piscicida* or MROs. The cognitive findings of this individual are generally consistent with those heavily exposed persons reported in a larger case series in Maryland.[4,5] However, the ability to generalize to other patients is difficult and our conclusions are more limited. Few cases have been described in detail and there is considerable variability in the neurologic examinations reported to date. The three laboratory workers who may have received acute exposures to toxins had acute encephalopathic episodes with confusion. In one case (Case A), this was followed by evidence of a mild peripheral neuropathy . This individual did not undergo neuropsychologic testing. The other two developed a short-term memory disturbance (Cases B and C). The patient in Case B underwent electromyography and nerve conduction velocity testing but no evidence of neuropathy was found. The patient in Case C was not tested.

Although the pathophysiology of the *Pfiesteria*-related encephalopathy remains to be explicated, preliminary results of fluorodeoxyglucose PET scans in a group of symptomatic Maryland cases suggest abnormalities in orbitofrontal and inferior temporal cortical areas that are implicated in attention and memory.[6] Hence, the convergence of data at this time is consistent with a limited encephalopathy involving primarily inferior frontal and temporal cerebral regions.

The evaluation of persons developing neurologic symptoms after suspected exposure to toxins from *Pfiesteria* or MROs is complicated by the fact that there is as yet no diagnostic test for *Pfiesteria* or MRO neurotoxicity and confirmation that a particular waterway contains *Pfiesteria* or MROs usually takes weeks or months. The neurologic evaluation should have two objectives: to exclude other possible etiologies and to characterize the disorder in the symptomatic patient. The extent of the evaluation of other potential causes will be guided by how severely ill the patient is, the presence of symptoms and signs of infection, toxicity or nutritional deficiency, and how restricted the neuropsychologic deficits are. A detailed history should be obtained exploring exposures to other infectious agents and toxins as well as the use of alcohol and recreational drugs. The patient should undergo a general medical examination, including a careful examination of any skin lesions. The presence of characteristic skin lesions would further support the diagnosis of *Pfiesteria* or MRO neurotoxicity. A detailed neurologic examination should be carried out. Any focal neurologic deficits would suggest that further evaluation should focus on localized processes. Sensory deficits or loss of reflexes would suggest neuropathy that should be evaluated with electromyography and nerve conduction velocity studies. The presence of soft signs as found in our case would be consistent with an encephalopathy, but any lateralizing findings should be followed up with imaging studies. Laboratory testing should include peripheral cells counts and chemistries to evaluate potential medical causes of encephalopathy (renal dysfunction, hepatic dysfunction, endocrine disorder, or nutritional deficiency). In many patients, examination of the cerebrospinal fluid for evidence of chronic infection (syphilis, Lyme disease, cryptococcus, etc.) or demyelinating disease will be appropriate. Computed tomographic x-ray scanning of the brain may be useful in excluding other etiologies in some patients but has not revealed abnormalities in patients with *Pfiesteria* toxin exposure. MRI scanning of the brain would be useful in excluding other neurologic etiologies and might show confirmatory changes in that possible temporal lobe changes were found in Case B. In some patients, electroencephalography may be useful in excluding epileptiform activity and may be confirmatory of encephalopathy if slowing is found. The occurrence of medical and neurological problems in

some patients after exposure to estuarine waters containing toxins from *Pfiesteria* or MROs presents a challenge to physicians. There is no diagnostic test for *Pfiesteria* or MRO toxicity so the diagnosis remains one of exclusion. Widespread publicity has created concern and anxiety in many patients while the medical understanding of the disorder is still very limited. Many patients present to physicians with medical complaints after exposure to estuarine waters where there is concern about *Pfiesteria* or MRO toxicity. It is important for the physician to be supportive of the patient and yet complete an appropriate and thorough evaluation to exclude other possible etiologies.

Acknowledgments

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References

1. Burkholder JM, Noga EJ, Hobbs CW, et al. New "phantom" dinoflagellate is the causative agent of major estuarine fish kills. *Nature* 1992;358:407–410.
2. Steidinger K, Truby E, Garrett J, Burkholder JM. Morphology and cytology of newly described dinoflagellates. In: Lassus E, Arzul G (eds). *Harmful Marine Algael Blooms*. Davis, LaVoisier, 1996.
3. Glasgow HB Jr, Burkholder JM, Schmechel DE, et al. Insidious effects of a toxic estuarine dinoflagellate on fish survival and human health. *J Toxicol Environ Health* 1995;46: 501–522.
4. Morris JG, Charache P, Grattan LM, et al. Medical evaluation of persons with exposure to water containing *Pfiesteria* or *Pfiesteria*-like dinoflagellates. Interim report to Secretary Wasserman, Maryland Department of Health and Mental Hygiene, 1997.
5. Grattan LM, Oldach D, Perl TM, et al. Problems in learning and memory occur in persons with environmental exposure to waterways containing toxin-producing *Pfiesteria* or *Pfiesteria*-like dinoflagellates. (Under review).
6. Cicelek AC, Villemagne VL, Dannals RF, et al. Measurable changes in regional cerebral glucose metabolism by FDG PET in subjects exposed to *Pfiesteria*. (Under review). ■

What Your Patients

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  News! The Easiest Way to Cut Your Breast Cancer Risk in Half. Fats that Foil Cancer.

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Decades, July 1998

Pfiesteria and the skin: a practical update for the clinician

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ABSTRACT: *Skin complaints, including an episodic burning sensation on contact with river water, were common among 13 persons with exposure to Maryland's Pocomoke River in the summer of 1997. While the majority of findings on dermatologic examination were unrelated to toxic dinoflagellate exposure, a subset of patients demonstrated otherwise unexplained erythematous, edematous papules on the trunk or extremities. Histopathologic findings were suggestive of an inflammatory, toxic, or allergic process. It may be speculated that these otherwise unexplained cutaneous findings represent a cutaneous reaction to* Pfiesteria *or* Pfiesteria*-like toxin; however, further evaluation of future affected persons will be warranted.*

In 1996 and 1997, when commercial fishermen and environmental workers on Maryland's Pocomoke River complained of health problems that were putatively linked with illness and death of large numbers of fish, it was observed that both affected fish and the symptomatic humans demonstrated significant abnormalities of the skin.[1] In the fish, "punched-out" cutaneous ulcerations that were temporally associated with large fish kills were noted. Affected persons reported a range of symptoms including fatigue, weight loss, cough, eye irritation, diarrhea, skin problems, and memory impairment.[2] Because skin complaints were a prominent feature of the complex of symptoms, a dermatologist was included in the initial medical team which, on August 22, 1997, examined 13 people with significant exposure to the Pocomoke.[2] In addition to the medical history, physician examination, and laboratory, pulmonary function,

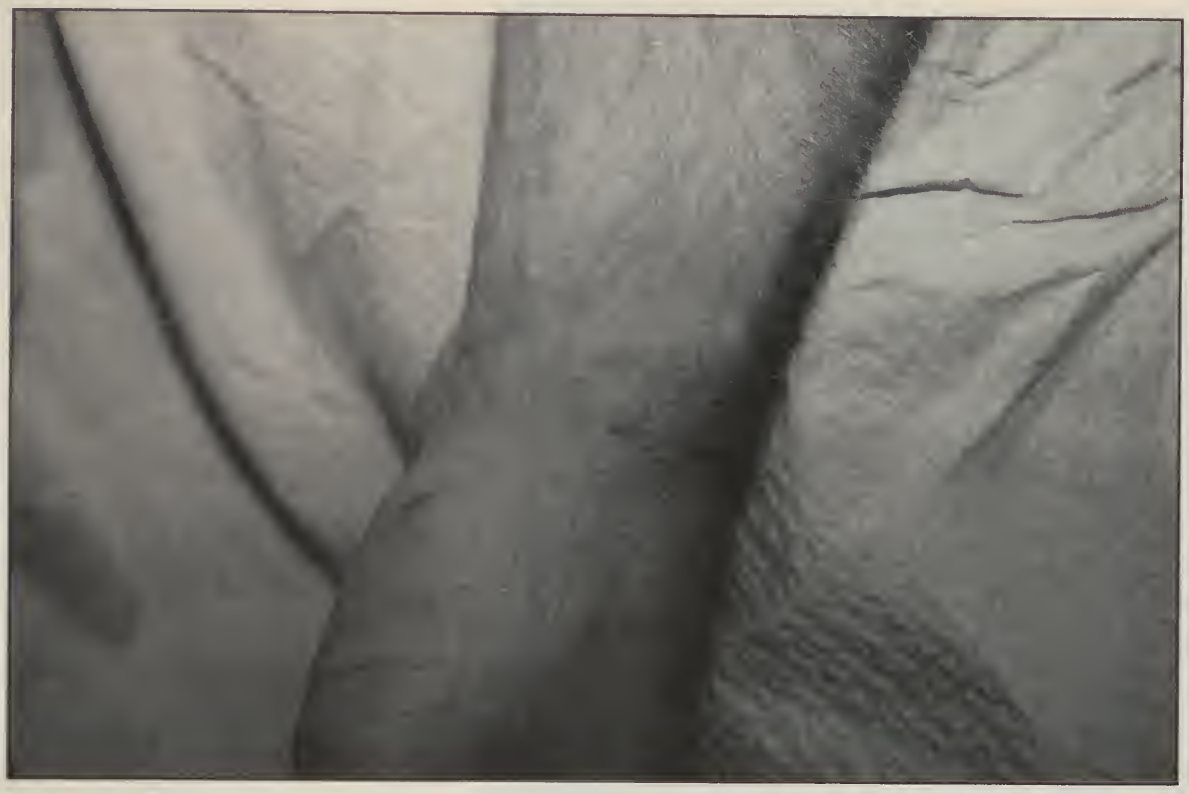

FIGURE 1. An erythematous, edematous papule on the arm of one of the 13 patients.

and neurocognitive tests, patients underwent a complete dermatologic history and physical examination. Skin biopsies were obtained from any unexplained or suspicious skin lesions, and all previous skin biopsy specimens were obtained and reviewed. Herein we summarize the findings from these clinical and histopathologic examinations.

Because dinoflagellate blooms are expected to recur during the 1998 summer season, further complaints of human skin disease may be anticipated. On recommendation of a multistate panel that convened in Baltimore in January 1998, this constellation of symptoms in the appropriate clinical setting shall be referred to as Estuary Associated Syndrome (EAS). Based on the 1997 experience, we suggest an approach to the evaluation of the skin in the setting of presumed EAS.

Nine of the 13 patients (70 %) reported a history of an intense cutaneous burning sensation on direct contact with Pocomoke River water during defined periods of the spring and summer of 1997. All except one reported immediate burning/stinging, which was obliterated by washing with bottled water or which resolved spontaneously over less than 12 hours. Several patients likened the sensation to that produced by contact with sea nettles although all denied seeing these animals at the onset of symptoms. One patient developed the burning sensation only after washing with tap water.

Seven of the 13 patients (54 %) described cutaneous lesions that appeared in temporal association with river water exposure. The most common skin complaints included itching, red bumps/sores, and scaling flat areas. Less common symptoms included blisters, scarring, insect bite, easy bruising, and rough spots on the face and hands. The majority of findings on examination of the skin were common dermatoses, including some likely related to occupational sun and water exposure but not to *Pfiesteria* or toxic causes (e.g., lamellar dyshidrosis, folliculitis, solar damage, and actinic keratoses). Some skin findings were completely unrelated to water exposure (e.g., acne, acne rosacea, seborrheic keratoses, skin tags, stasis dermatitis). There were, however, several persons with otherwise unexplained edematous, erythematous, or skin-colored 0.5- to 1.0-cm papules (**Figure 1**), scaling, erythematous 5- to 20-mm patches (potassium hydroxide preparations negative for fungal elements), widespread

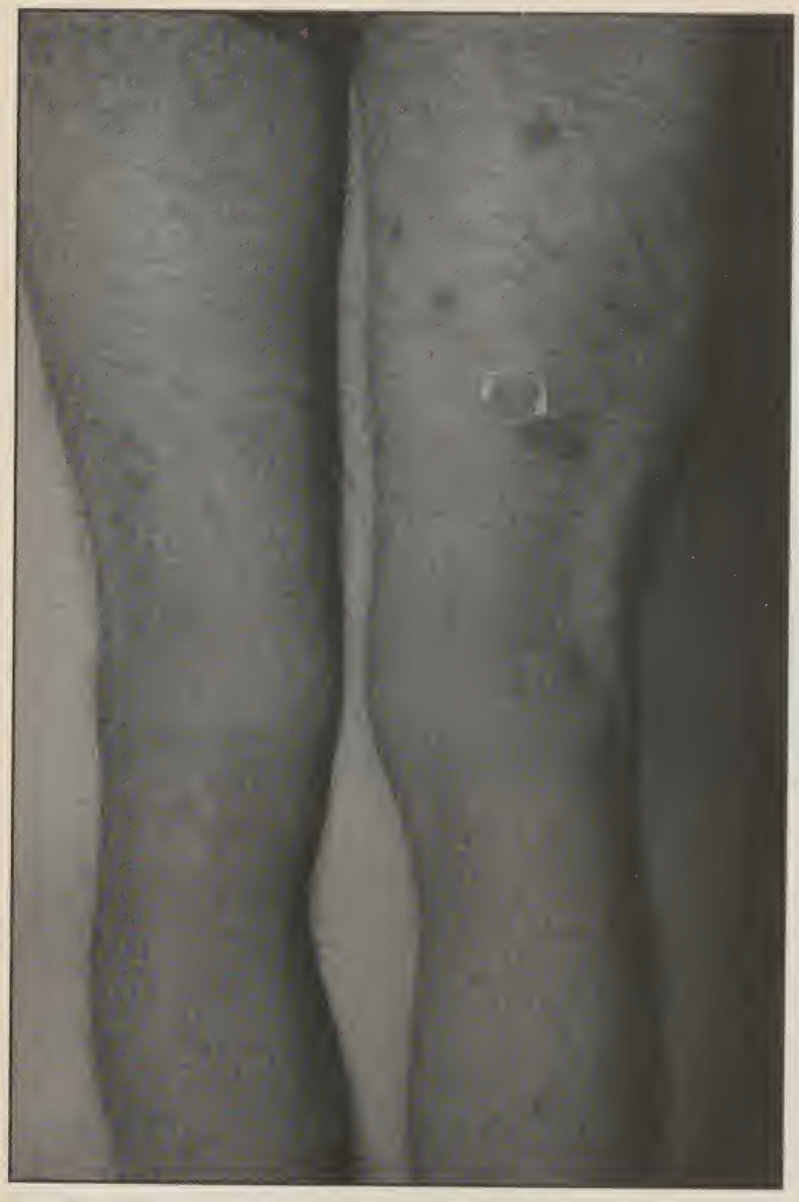

FIGURE 2. Annular erythematous patches were present over the face, trunk and extremities of this man who waterskied on the Pocomoke River at the time of a major fish kill.
(Slide courtesy of Ritchie Shoemaker, M.D.)

symmetrical, annular (ring-shaped) erythematous patches (**Figure 2**), and clustered, depressed, 3- to 4-mm cribiform scars. Punched-out ulcerations similar to those seen in affected fish were not observed. Eight lesional skin biopsies from six patients were examined. With the exception of one verrucous keratosis (wart-like scaly growth, unlikely to be toxic in origin), the diagnoses in 7 of the 8 specimens included variable patterns of inflammation suggesting reactive erythema, allergic, toxic, or eczematous reactions. Direct immunofluorescence staining on one specimen (an erythematous patch) was negative.

In summary, most patients examined who had significant exposure to the Pocomoke River at the time of dinoflagellate blooms and fish kills experienced a variety of cutaneous symptoms. We are of the opinion that most skin findings were unrelated to the effects of the dinoflagellate bloom. There was, however, a minority of patients whose skin findings were otherwise unexplained. The typical lesions were one or two relatively nonspecific 0.5- to 1.0-cm red swellings on the extremity or trunk. In a single patient numerous dramatic erythematous annular patches predominated. The histopathologic assessment of these lesions supported the possibility of a toxic/allergic inflammatory reaction. Due to the lack of specificity of the clinical and histopathologic findings, our conclusions are conservative: we believe that while most skin findings in our patients were unrelated to *Pfiesteria* or *Pfiesteria*-like dinoflagellate exposure, it is conceivable, but unproved, that a fraction of patients may have demonstrated a cutaneous toxic/allergic inflammatory response to exposure. It is hypothesized that the cutaneous burning sensation may also reflect a reaction to toxin exposure; laboratory evaluation, addressing possible mechanisms by which this may occur, is under investigation by our group and others. Further investigation, both clinically (in careful evaluation of future patients) and in the laboratory is clearly warranted. Furthermore, we recommend that any patient being evaluated for possible EAS should undergo a careful, completed cutaneous examination. We suggest that patients with unexplained skin findings be referred to a dermatologist, when possible. Lesional photographs should be obtained and skin biopsies be performed when clinically indicated.

References

1. Matuszak DL, Sanders M, Taylor JL, Wasserman MP. Toxic *Pfiesteria* and human health. *Md Med J* 1997;46:515–520.
2. Grattan LM, Oldach D, Perl TM, et al. Problems in learning and memory occur in persons with environmental exposure to waterways containing toxin-producing *Pfiesteria* or *Pfiesteria*-like dinoflagellates. (Under review). ■

Neurobehavioral complaints of symptomatic persons exposed to *Pfiesteria piscicida* or morphologically related organisms

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ABSTRACT: *Over the next year, additional persons in Maryland may be at risk for exposure to toxic* Pfiesteria *or morphologically related organisms. These persons may present with a variety of memory and other behavioral complaints. This paper examines the kinds of complaints that persons with a documented* Pfiesteria*-related syndrome have compared to a nonexposed control group. The exposed group was more likely to report difficulties with concentration, forgetfulness, prospective memory, and information overload as well as feelings of confusion, bewilderment, and uncertainty as direct effects of toxin exposure. The exposed group was also more likely to report feeling uneasy, on edge, nervous, and shaky, which is probably a reaction to their newly acquired cognitive deficits and uncertainty about their recovery. In contrast, retrograde memory loss, disturbances of language or social behavior, depression, anger, hostility, or diminished activity levels are not symptoms that exposed persons are likely to report.*

A reoccurrence of the toxic dinoflagellate *Pfiesteria piscicida* or morphologically related organisms (MROs) could occur in select estuary waters in Maryland in 1998 (see Oldach et al., page 113).[1] Subsequently, additional persons may be at risk for exposure and seek medical consultation. The community physician's challenge is determining which patients have probable or suspected exposure sequelae and which do not. This may be difficult as acute medical, neurologic, and dermatologic symptoms quickly subside (usually within 3 days to 1 week) and the patient is left with isolated, residual cognitive changes of mild to moderate

severity.[2] These residual cognitive alterations in learning and memory are detectable by routine mental status testing (e.g., the Mini Mental Status Examination) in about 25% of the severely exposed cases. The remaining persons have cognitive difficulties, which interfere with daily functioning, in domains that brief mental status exams do not reliably assess.

TABLE 1. Memory complaints of exposed symptomatic persons

Concentration	54%
Forgetfulness	90%
Prospective memory	60%
Information overload	25%

Despite the limited utility of traditional mental status screening examinations, in many of these postacute cases, a first level screening may be completed almost entirely through a clinical symptoms interview. To assist others in conducting such a screening examination, this article identifies the kinds of clinical and subjective complaints that are most likely to characterize persons with a postacute *Pfiesteria*-related syndrome.

Method

Subjects. Participants included 18 men (n=14) and women (n=4) with a documented exposure to estuary waters with *Pfiesteria* or MROs who obtained abnormal performances on standardized, neuropsychologic testing that could not be explained by any other reason (e.g., developmental learning problem, substance abuse, dementia, feigned amnesia, or malingering). All participants had learning impairments as measured by the Rey Auditory Verbal Learning Test ($p < .05$) and at least one other measure (Stroop Color Word Interference Test, Trails B, or Grooved Pegboard Test)[3,4] compared to the comparison group. The comparison group included 19 persons without exposure to *Pfiesteria* or MRO-laden waters who were matched for age, gender, education, and occupational status with the exposed, symptomatic group.

Assessment of subjective memory complaints. The subjective complaints of 18 exposed, symptomatic cases were obtained through a standardized, open-ended interview. The complaints were classified based upon their nature and frequency of occurrence in the exposed group.

General assessment of mood and personality. For determining other subjective complaints which could be related to mood, affect or personality, the Profile of Mood States[5] (POMS) was administered to the exposed cases and nonexposed control subjects. The POMS is a self-report, 65-item paper and pencil questionnaire. It requires persons to review adjective/feeling descriptors and determine the extent to which the descriptor applies to them over the past week. Responses are based upon a five-point Likert-type scale (0=not at all; 4= extremely). This test is described at greater length in the article by Tracy et al. on page 130 in this issue.[6] The items which best discriminated between cases and controls were identified through analysis of frequency of complaints and parametric statistical procedures.

Results

Subjective memory complaints. The most frequent memory complaints for the exposed, symptomatic patients may be found in **Table 1**. These include complaints of problems with concentration, forgetfulness, prospective memory, and information overload. To date there has been no evidence of retrograde memory loss or loss of previously learned knowledge (e.g., general fund of verbal knowledge) in the exposed group. No persons in the control group reported subjective memory complaints.

General assessment of mood and personality. No person in the exposed or nonexposed group had elevations on the POMS subscales suggestive of anxiety, mood or affective disturbance (see Tracy et al., in this issue).[6] However, there were some items on the measure that discriminated between the exposed and nonexposed participants (see **Table 2**). Exposed cases were more likely than the nonexposed controls to report feeling shaky, on edge, uneasy, nervous, confused, bewildered, and uncertain. In addition, exposed cases were also more likely to report concentration difficulties.

In contrast, neither the exposed nor nonexposed persons reported symptoms commonly associated with depres-

TABLE 2. Items on the Profile of Mood States that discriminated the exposed cases from the nonexposed controls

	T score	significance
Shaky	-3.17	.003
On edge	-2.61	.013
Uneasy	-3.82	.001
Nervous	-2.13	.041
Unable to concentrate	-3.98	.001
Uncertain about things	2.34	.025
Confused	-2.99	.005
Bewildered	2.79	.008

sion (e.g., unhappy, sad, blue, hopeless) or hostility (angry, annoyed, resentful, bitter). Both groups were also equally likely to endorse adjectives suggestive of vigorousness and high energy (e.g., active, cheerful, alert).

Discussion

There appears to be a variety of memory complaints and other subjective difficulties in persons exposed to *Pfiesteria* or MRO-laden water compared to nonexposed controls. Some of the complaints may represent the direct sequelae of exposure. These include the memory complaints, concentration difficulties, confusion and bewilderment. Other complaints (e.g., shaky, on edge, uneasy, nervousness) probably represent a reaction to their acquired memory problem and subsequent problems in daily living that it presents. It is noteworthy that symptoms associated with depression or hostility were not more likely in the exposed group. Instead, the exposed persons maintained their premorbid levels of energy, vigor, and cheerfulness as a group. The exposed persons also remained occupationally and socially active despite their difficulties with memory and attention. This probably reflects their good, problem-focused coping skills, at least for the short term.

It is very important to keep in mind that the aforementioned complaints are not specific to *Pfiesteria* or MRO exposure. In some patients these complaints may reflect other neurologic conditions such as early dementia or stroke, psychiatric problems (e.g., anxiety), or age-associated memory impairments. A routine neurologic exam is usually indicated in patients with the new onset of memory problems. Standardized neuropsychologic assessment procedures may also be useful to assist with differential diagnosis.

If you have a patient who believes he or she has a *Pfiesteria*-related illness, the following is recommended:

1. Encourage the patient to elaborate on his or her cognitive symptoms in an open-ended interview. Query for examples of how his or her cognitive difficulties interfered with his or her activities of daily life. This includes both routine and nonroutine activities.
2. Compare the patient's complaints to those reported by exposed, symptomatic patients.
3. Avoid teaching the patient the currently identified symptom complex.
4. You may attempt to administer the Mini Mental Status Examination or parts of it (presenting three words with delayed recall). However, unless the patient is acutely ill or very heavily exposed, they will probably pass this test. It is noteworthy that all of our exposed, symptomatic patients were well oriented (time, place, personal information) during postacute recovery and could repeat five to seven digits forward and reverse.
5. If you suspect a memory disturbance, you may consider obtaining a standardized neuropsychologic evaluation. If you suspect the memory disturbance is exposure-related, be sure to ask the consulting neuropsychologist to include measures of complex learning and memory, divided attention, selective attention, and psychomotor speed and dexterity in their battery. A personality measure (e.g., Minnesota Multiphasic Personality Inventory) may also be indicated.

Please consult the resource directory in this issue of the *Maryland Medical Journal* for specialized consultation as needed.

Acknowledgments

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References

1. Oldach D, et al. Strategies for environmental monitoring of toxin producing phantom dinoflagellates in the Chespeake. *Md Med J* 1998;47:113–119.
2. Glasgow HB Jr, Burkholder JM, Schmechel DE, et al. Insidious effects of a toxic estuarine dinoflagellate on fish survival and human health. *J Toxicol Environ Health* 1995;46: 501–522.
3. Grattan LM, Oldach D, Perl TM, et al. Problems in learning and memory occur in persons with environmental exposure to waterways containing toxin-producing *Pfiesteria* or *Pfiesteria*-like dinoflagellates. (Under review).
4. Morris JG, Charache P, Grattan LM, et al. Medical evaluation of persons with exposure to water containing *Pfiesteria* or *Pfiesteria*-like dinoflagellates. Interim Report to Secretary Wasserman, Maryland Department of Health and Mental Hygiene, 1997.
5. McNair DM, Lorr M, Droppleman LF. *Profile of Mood States Manual*. San Diego: Educational and Industrial Testing Service (EdITS), 1992.
6. Tracy JK, Oldach D, Greenberg DR, Grattan LM. Psychologic adjustment of watermen with suspected exposure to *Pfiesteria piscicida*. *Md Med J* 1998;47:130–132. ■

Psychologic adjustment of watermen with exposure to *Pfiesteria piscicida*

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ABSTRACT: *Preliminary study of the psychologic adjustment of watermen with exposure to* Pfiesteria piscicida *was conducted on watermen with the most severe exposures and their occupationally matched controls. Participants in the exposed group were seven symptomatic recreational and commercial fishermen who had direct exposure to the Pocomoke River or other estuarial waters on Maryland's Eastern Shore before, during, and/or after periods of documented fish kills and* Pfiesteria *activity. The control group included eight commercial fishermen who worked on the ocean side of the Eastern Shore and had no reported exposure to estuaries with documented* Pfiesteria *activity. Both exposed symptomatic and nonexposed watermen completed the Profile of Mood States to assess depression, anxiety, and other relevant mood states as part of their participation in the larger investigation of the human health effects of* Pfiesteria piscicida. *Preliminary results suggest that both exposed symptomatic and nonexposed watermen are psychologically healthy and exhibit what psychologists refer to as the classic Iceberg Mood Profile. The Iceberg Profile is characterized by endorsement of symptoms suggestive of high energy, enthusiasm, and positive mood (e.g., lively, active, energetic, cheerful, vigorous, etc.) and relative minimization of symptoms suggestive of negative or depressed mood (e.g., tense, anxious, restless, grouchy, forgetful). Therefore, the* Pfiesteria*-related symptom complex documented in the exposed watermen cannot be explained by functional or psychiatric factors and is probably due to exposure.*

The potentially deleterious effects of the dinoflagellate *Pfiesteria piscicida* on human cognitive functioning were first described in anecdotal reports of three laboratory workers from North Carolina who had aerosol and dermal contact with the suspected toxin.[1] The cognitive manifestations described in these seminal cases included difficulties with attention, concentration, memory, and some aspects of language (e.g., reading, verbal fluency). More recently, a group of recreational and commercial fishermen from Maryland's Eastern Shore began reporting medical and neuropsychologic symptoms following exposure to estuaries where toxic activity of *Pfiesteria* resulted in sizable fish kills. Although the Maryland watermen reported numerous physical symptoms (e.g., skin irritation, headaches, gastrointestinal distress, respiratory irritation), the most frequent complaints were cognitive. The cognitive symptoms reported by the Maryland watermen included confusion, transient episodes of disorientation, difficulty concentrating, and new onsets of forgetfulness.

Objective neuropsychologic testing conducted by Maryland's state-appointed medical team indicated that persons with long-term, intense exposures (i.e., daily contact over several months) to waters with documented toxic activity of *Pfiesteria* performed poorly on tests of new learning and memory, selective and divided attention, and psychomotor speed and dexterity.[2,3] Since performance on these cognitive measures can be adversely affected by diagnoses of anxiety or depression,[4–8] it is important to determine the mood and personality functioning of the exposed persons under study. Therefore, the current study represents preliminary efforts to examine the psychological adjustment of persons with exposure to *Pfiesteria* or morphologically related organisms (MROs).

Method

Participants. Medical, developmental, and psychiatric history were gathered on all potential participants. Persons were excluded from participation if their history revealed any of the following: medical history significant for head injury, tumor, stroke, dementia, or other chronic neurologic illness; psychiatric history significant for depression, anxiety, or substance abuse; or history of developmental learning disability. Because persons with the most intense exposures appeared to evince the most striking cognitive impairments,[2,3] this preliminary study focused on Maryland recreational and commercial fishermen who had the most severe exposures. Severe exposure was defined as contact with affected waterways for six to eight hours per day for at least five to six days per week. This included extensive skin contact with water, as well as exposure to aerosolized spray from the water. The exposure group included commercial fishermen (n = 7) who had direct exposure to the Pocomoke River or other estuarial waters on Maryland's Eastern Shore before, during, and/or after periods of documented fish kills and *Pfiesteria* activity. The control group included commercial fishermen (n = 8) who worked on the ocean side of the Eastern Shore and had no reported exposure to estuaries with documented toxic *Pfiesteria* activity. All participants in this pilot study were male. The mean age of exposed persons was 39.2 years, and the mean age of nonexposed controls was 37.8 years. Exposed persons had a mean of 11.1 years of education; the nonexposed controls had a mean of 11.8 years of education.

Measures/procedures. All participants completed a detailed interview about the nature of their exposures and received a neuropsychologic screening examination that included standard, objective measures of memory, learning, attention, constructional praxis, language, and executive functions as part of their participation in the larger investigation of the human health effects of *P. piscicida* (or MROs). A full description of the cognitive measures administered, procedures for data collection, and results of cognitive evaluation are reported in Grattan et al.[2] and Morris et al.[3] In summary, problems with some aspects of memory, attention, and psychomotor speed were associated with exposure.

As part of the original investigation, data regarding the psychologic adjustment of participants were collected to screen for psychologic factors that could potentially influence performances on various cognitive measures such as memory, psychomotor speed, and selective or divided attention. To assess the psychological adjustment of participants, all participants completed the Profile of Mood States (POMS) at the time of initial evaluation. The POMS[9] is a pencil and paper questionnaire that requires the participant to consider 65 adjectives/feelings on a five-point Likert-type scale (0 = not at all, 4 = extremely). Participants are asked to consider each item and to choose the response that best describes how they have been feeling the past week. The 65 items of the POMS can be separated into six distinct subscales: tension-anxiety, depression-dejection, anger-hostility, vigor-activity, fatigue-inertia, and confusion-bewilderment. In addition, a Total Mood Disturbance score can be generated by assigning a negative weight to the vigor-activity subscale and summing the scores of all six scales.

Results

To determine whether there were any differences in psychologic adjustment between exposed and nonexposed watermen, each profile was interpreted for evidence of clinical abnormality or psychopathology based upon published normative data.[8] Findings indicated that no persons in the exposed or nonexposed groups obtained scores outside of the normal range on any subscale, when compared with normative data for adult males. Moreover, the mean T scores for both the exposed and nonexposed groups were well within the average range on all POMS subscales. Inspection of the pattern of profile elevations for both exposed and nonexposed groups indicates that most persons in the nonexposed group exhibited the classic Iceberg Profile, with T scores greater than 50 on the vigor subscale and scores on all other subscales below a T score of 50. Persons in the exposed group exhibited a similar, more attenuated version of the Iceberg Profile, with some having mild elevations above a T score of 50 on the fatigue subscale.

Discussion

Results of the present study suggest that the persons in the exposed group are essentially psychologically healthy and vigorous persons. With the exception of mild elevations of the fatigue subscale for some persons in the exposed group, the profile configurations for both groups reflect what psychologists refer to as a classic Iceberg Profile. The Iceberg Profile is characterized by endorsement of many symptoms suggestive of high energy, enthusiasm, and positive mood (e.g., lively, active, energetic, cheerful, vigorous, etc.) and little or no acknowledgment of symptoms suggestive of negative or depressed mood (e.g., tense, anxious, restless, grouchy, forgetful). Specifically, the Iceberg Profile is characterized by elevation of the vigor subscale above a T score of 50 and scores on the remaining subscales below T scores of 50.[9] The Iceberg Profile is generally conceptualized as an indicator of overall psychologic adjustment and positive affect[9] and is also exhibited by professional and elite amateur athletes.[10,11]

The only difference between the profiles of the exposed and nonexposed persons was in the endorsement of items related to fatigue by some members of the exposed group. Acknowledgment of symptoms of fatigue may reflect the sequelae of exposure to the *Pfiesteria* toxin or a MRO. Although overall the fatigue scores were greater for the exposed persons than the nonexposed controls, this score was well within normal limits for both groups.

The size of the current sample is small and may raise questions about the ability to generalize the current findings. Nevertheless, it is noteworthy that there was consistency in subscale elevations of exposed and nonexposed persons. Moreover, when compared with nationally published normative data, no person in either group evinced scores on any subscale that were outside of the normal range. Hence the data suggest that in the original sample of *Pfiesteria*-exposed and symptomatic watermen in Maryland, there was no evidence for unusual mood or personality disturbance. In fact, this group was normal, healthy, and vigorous, and it is unlikely that psychologic factors could explain their cognitive disturbances.

Acknowledgment

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References

1. Glasgow HB Jr, Burkholder JM, Schmechel DE, et al. Insidious effects of a toxic estuarine dinoflagellate on fish survival and human health. *J Toxicol Environ Health* 1995; 46:501–522.
2. Grattan LM, Oldach D, Perl TM, et al. Problems in learning and memory occur in persons with environmental exposure to waterways containing toxin-producing *Pfiesteria* or *Pfiesteria*-like dinoflagellates. (Under review)
3. Morris JG, Charache P, Grattan LM, et al. Medical evaluation of persons with exposure to water containing *Pfiesteria* or *Pfiesteria*-like dinoflagellates. Interim Report to Secretary Wasserman, Maryland Department of Health and Mental Hygiene, 1997.
4. Brand N, Jolles J. Information processing in depression and anxiety. *Psychol Med* 1987;17:145–153.
5. Buckelew SP, Hannay HJ. Relationships among anxiety, defensiveness, sex, task difficulty, and performance on various neuropsychological tasks. *Percept Mot Skills* 1986;63: 711–718.
6. Caine ED. The neuropsychology of depression: The pseudodementia syndrome. In: I Grant, KM Adams (eds). *Neuropsychological assessment of neuropsychiatric disorders*. New York: Oxford University Press, 1986.
7. Eysenck MW. Anxiety and cognitive functioning: A multifaceted approach. In: RG Lister, HJ Weingartner (eds). *Perspectives in cognitive neuroscience*. New York: Oxford University Press, 1991.
8. Massman PJ, Delis DC, Butters N, et al. The subcortical dysfunction model of memory deficits in depression: Neuropsychological validation in a subgroup of patients. *J Clin Exp Neuropsychol* 1992;14:687–706.
9. McNair DM, Lorr M, Droppleman LF. *Profile of Mood States Manual*. San Diego: Educational and Industrial Testing Service (EdITS), 1992.
10. Morgan WP. The trait psychology controversy. *Res Q Exerc Sport* 1980;51:50–76. ■

A critical review of the *Pfiesteria* hysteria hypothesis

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ABSTRACT: *Mass hysteria or mass psychogenic illness is the spread of the belief of an illness (symptoms and the origins of the symptoms) through a population. The characteristics of mass psychogenic illness were reviewed and compared to the recent outbreak of human illness in the Pocomoke region in Maryland in the summer of 1997. The findings suggest that the nature of the symptom complex—the onset and recovery course; the absence of secondary gain or job-related stress for most of the symptomatic persons; the predominance of males in the symptomatic group; and the baseline emotional stability of all persons examined—are inconsistent with the reported features of psychogenic illness in response to unknown environmental or chemical toxins. Although there may be individuals who exhibited hypochondriacal, hysterical, or other functionally based reactions, the recent outbreak of* Pfiesteria*-related illness probably does not represent an episode of mass psychogenic illness.*

In the late summer of 1997, the new onset of neurocognitive disturbances were objectively documented in persons exposed to estuary waters with *Pfiesteria piscicida* or morphologically related organisms (MROs).[1-4] These difficulties were characterized by problems with new learning and memory, selective and divided attention, and psychomotor speed and dexterity. Similar cognitive disturbances were previously reported in laboratory workers exposed to *Pfiesteria piscicida,* [5] and learning and memory impairments were found in laboratory rats injected with acquaria water containing the toxin.[6] Despite the recent convergence of data, there is relatively limited scientific knowledge about *P. piscicida* as an emerging pathogen, how it enters the human body, its mechanisms of neurotoxicity,

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and its long-term effects on human health. This limited knowledge, combined with numerous socioeconomic, sociopolitical, and media forces led some clinicians, politicians, and members of the press to speculate that Maryland's 1997 outbreak represented an episode of epidemic mass psychogenic illness.

Mass psychogenic illness

Episodes of mass psychogenic illness, historically referred to as mass hysteria or hysterical contagion, have been reported among groups of people since medieval times.[7] Mass psychogenic illness refers to the spontaneous outbreak of illness in an individual, which suggests organic disturbance, but is attributable to psychologic factors.[8] Thus, an outbreak of mass psychogenic illness is the spread of the belief of an illness (symptoms and the origins of the symptoms) through a population.[9] It is well established that mass psychogenic illness is the result of complex sociopolitical variables. However, a common theme in most theories is that it represents a group stress reaction. A variety of mechanisms have been identified through which group stress becomes an episode of mass psychogenic illness. The two most dominant theories are summarized as follows.

One theory, initially proposed by Kerckhoff and Back[10] and expanded upon by others,[11] suggests that mass psychogenic illness is initiated and spread in groups who are under increased stress. This stress leads to autonomic arousal and physical symptoms in the group. One individual misattributes his or her physical symptoms to a mysterious element or toxin, and other group members then begin to misinterpret their own increased arousal as symptoms of the illness. As the belief of the mysterious toxic agent spreads among the group, more and more persons accept the belief. The persons usually do not obtain any secondary gain from the illness and often find increased arousal levels a negative experience. Therefore, when authorities provide reassurance that there is no toxin present, the illness quickly dissipates and stress levels are reduced.

A second theory characterizes the illness as a form of unconscious conversion reaction among group members of a community under stress.[12,13] Similar to conversion reactions among isolated individuals, in the case of mass psychogenic illness, the group members unconsciously learn that the adoption of the sick role is a means of gaining positive attention from others, and a relief from the initial stressor. The initial cases tend to receive sympathetic attention, and there is no challenge by authorities that the symptoms are the result of a toxic agent. Thus, all members of the group receive similar positive attention. The illness is maintained as long as the adoption of the sick role is seen as generally positive by the members of the group. As soon as it acquires a negative connotation (i.e., the media begins to call the epidemic mass hysteria) the illness quickly dissipates within the group.

The accumulation of studies and literature review of mass psychogenic illness [7,8,12,14–19] have contributed to the development of a taxonomy of the characteristics typical of mass psychogenic illness outbreaks. These characteristics include: 1) The absence of laboratory data suggesting a physical cause of illness.[8,14] 2) A preponderance of female patients in the symptomatic group, particularly women [8,14,15] in low- paying, routine jobs.[17] It has also been well established in the literature that younger females are most susceptible to outbreaks of epidemic psychogenic illness.[7,18] 3) There is direct evidence for the purported transmission of illness by sight or sound.[8,14,15] Along this vein, there is no correlation between the symptom severity and the level of exposure to the presumed toxin.[17] 4) There is an absence of illness among other groups sharing the environment.[16] 5) The prototypical symptoms include hyperventilation and syncope,[8,14,15] with other frequently occurring symptoms including nausea, stomach cramps, uncontrollable trembling or twitching, dryness of mouth and throat, fainting, mild convulsions, or temporary paralysis.[12] 6) There is benign morbidity in initial symptoms followed by a rapid spread and remission of symptoms.[8,14,15] 7) There is strong evidence for unusual physical or psychologic stress in the group.[8,12,14] The most frequently reported stress is job-related.[17]

Comparative analysis of *Pfiesteria*-related illness outbreak and mass psychogenic illness

Following is a comparative analysis of the outbreak of *Pfiesteria*-related illness in Maryland compared to the seven characteristics which typify mass psychogenic illness. The analysis is based on the data from 18 exposed, symptomatic persons who were determined to have a *Pfiesteria*-related symptom complex.

1.) ***An outbreak of mass psychogenic illness involves the absence of laboratory data to suggest a physical cause.*** Objective psychometric testing indicated significant disturbances in new learning and memory that could not be explained by premorbid or psychologic factors. These findings were similar to those previously reported in exposed laboratory workers [5] and have also been replicated with

animal models.[6] In addition, preliminary dermatologic findings in some cases suggested the presence of a toxic or allergic reaction. Although the systematic study of the human health effects of exposure to *P. piscicida* or MROs is still in its infancy, preliminary findings suggest objective human health effects.[1,2]

2.) ***An outbreak of mass psychogenic illness has a preponderance of female patients, particularly females who are young and in low-paying routine jobs.*** The exposed, symptomatic cases included fourteen men and four women. The individuals with the most severe self-reported and objectively measured symptoms (n=7) were all male, their average age was 39 years, and they reported no unusual job-related stressors. This is contrary to the typical gender and demographic pattern for mass psychogenic illness.

3.) ***In an outbreak of mass psychogenic illness, the apparent transmission of illness is by sight or sound and there is no relationship between exposure intensity and symptom severity.*** The Maryland Medical Team's study of *Pfiesteria*-related illness suggests a direct dose-response effect, where the objective learning and memory impairments were the most severe in persons in the highest exposure group.[1,2] Although several individuals among the exposed, symptomatic cases knew each other, the best predictor of symptom severity was intensity and duration of exposure to the affected estuaries.

4.) ***In situations of mass psychogenic illness there is frequently an absence of illness among other groups sharing the environment.*** To our knowledge, all persons with significant exposure to the questionable waterways were studied. Only one of 18 exposed persons was symptom free, with normal performance on all cognitive measures. To date, we know of no other groups who spent significant amounts of time in the affected waterways. Further studies are underway to identify other potentially exposed persons.

5) ***Hyperventilation and syncope are prototypical symptoms in an outbreak of mass psychogenic illness. Other commonly reported symptoms in mass psychogenic illness epidemics include nausea, stomach cramps, uncontrollable trembling or twitching, dryness of mouth and throat, fainting, mild convulsions, or temporary paralysis.*** The symptoms that distinguished the *Pfiesteria*-exposed symptomatic group from an age, gender, education, and occupationally matched control group were disorientation, forgetfulness, headache, skin lesions, and burning skin on contact with the water.[1,2] The persons with suspected *Pfiesteria*-related illness did not frequently report the symptoms usually associated with mass psychogenic illness.

6.) ***There tends to be benign morbidity in initial symptoms followed by a rapid spread and remission of symptoms when the illness no longer produces secondary gain, but acquires a negative connotation.*** For most persons studied, there was little secondary gain in acquiring symptoms associated with *Pfiesteria*-related illness. In Maryland, the initial symptom outbreak was greeted by officials with suspicion, and by some members of mass media with the label of *Pfiesteria* hysteria. When the Maryland Medical Team confirmed the presence of a probable toxic reaction, the incidence of exposed symptomatic persons was not affected. In addition, the symptoms neither worsened nor abated in response to these negative connotations or when the medical team legitimized the symptom complex. Moreover, the most severely affected persons (i.e., commercial fishermen) had nothing to gain by assuming a sick role. They were self-employed persons without access to paid sick leave, supplemental insurance, or disability benefits. The symptoms improved only when the persons discontinued contact with the affected waterways. The degree of improvement was directly associated with the initial level of exposure and degree of impairment.[1,2]

7.) ***In cases of mass psychogenic illness there is evidence for unusual psychologic or physical stress in the group.*** Based upon clinical interview and psychometric assessment[20] there is no evidence that our identified cases had any unusual stresses at baseline. In fact, as Tracy et al. reported,[20] the most severely affected persons were healthy, vigorous, and demonstrated good mental health.

Conclusion

The aforementioned comparative findings suggest that the recent outbreak of *Pfiesteria*-related illness on Maryland's Eastern Shore did not represent an episode of mass psychogenic illness. It is important to note that our findings do not preclude the possibility of hysterical reactions, conversion disorders, hypochondriasis, factitious disorders, or malingering in some individuals. Our ongoing studies and case management procedures carefully screen for persons with potentially psychologic explanations for their symptoms.

Numerous psychologic and sociopolitical variables potentially contribute to epidemics of mass psychogenic ill-

ness.[21,22] Many of these factors are taken into account in our present and ongoing studies of *Pfiesteria*-exposed persons. Conspicuous by its absence in the characteristics common to episodes of mass psychogenic illness is the role of the media. Extant data suggest that media reports do not typically impact the onset of symptoms or the course of an epidemic of mass psychogenic illness.[8,23]

As Faust and Brilliant caution, we should not use mass hysteria or psychogenic illness as a substitute for an incomplete investigation of low-level environmental contamination.[24] At a practical level, if a patient reports the possibility of a *Pfiesteria*-related illness, we recommend that the complaint be taken seriously. We encourage practicing clinicians to seek objective documentation of the exposed patient's medical or cognitive impairments. With appropriate use of diagnostic procedures it will be possible to determine with reasonable certainty whether or not an individual has a *Pfiesteria*-related illness, or an alternate explanation for his or her complaints. The resource guide at the end of this issue of the *Maryland Medical Journal* may assist you with obtaining specialized consultations if you need them. Meanwhile, ongoing laboratory studies are underway to systematically examine all factors, including the interaction of physical and psychologic elements that potentially explain the symptoms associated with *Pfiesteria*-related illness.

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References

1. Morris JG, Charache P, Grattan LM, et al. Medical evaluation of persons with exposure to water containing *Pfiesteria* or *Pfiesteria*-like dinoflagellates. Interim Report to Secretary Wasserman, Maryland Department of Health and Mental Hygiene, 1997.
2. Grattan LM, Oldach D, Perl TM, et al. Problems in learning and memory occur in persons with environmental exposure to waterways containing toxin-producing *Pfiesteria* or *Pfiesteria*-like dinoflagellates. (Under review).
3. Morris JG. Introduction to the special issue on *Pfiesteria*. *Md Med J* 1998;47:104–105.
4. Lowitt M, Kauffman L. *Pfiesteria* and the skin: A practical update for the clinician. *Md Med J* 1998;47:124–126.
5. Glasgow HB, Burkholder JM, Schmechel DE, et al. Insidious effects of a toxic estuarine dinoflagellate on fish survival and human health. *J Toxicol Environ Health* 1995;46: 501–522.
6. Levin, ED, Schmechel DE, Burkholder JM, et al. Persisting learning deficits in rats after exposure to *Pfiesteria piscicida*. *Environ Health Perspect* 1997;46:951–952.
7. Sirois, F. Epidemic hysteria. *Acta Psychiatr Scand Suppl* 1974;252:5–45.
8. Small GW, Borus JF. The influence of newspaper reports on outbreaks of mass hysteria. *Psychiatr Q* 1987;58:269–278.
9. Baker EL Jr. Neurologic and behavior disorders. In: Levy BS, Wegman DH, ed. *Occupational Health: Recognizing and Preventing Work-related Disease*. Boston: Little Brown & Co., 1983.
10. Kerckhoff AC, Back KW. *The June Bug: A Study of Hysterical Contagion*. New York: Appelton-Century-Crofts, 1968.
11. Olkinuora M. Psychogenic epidemics and work. *Scand J Work Environ Health* 1984; 10:501–504.
12. Gehlen FL. Toward a revised theory of hysterical contagion. *J Health Soc Behav* 1977;18:27–35.
13. Schuler EA, Parenton VJ. A recent epidemic of hysteria in a Louisiana high school. *J Soc Psychol* 1943;17:221–235.
14. Small GW, Borus JF. Outbreak of illness in a school chorus: toxic poisoning or mass hysteria? *N Engl J Med* 1983;308: 632–635.
15. Small GW, Nicholi AM. Mass hysteria among schoolchildren: early loss as a predisposing factor. *Arch Gen Psychiatry* 1982;39:721–724.
16. Small GW, Propper MW, Randolph ET, Eth S. Mass hysteria among student performers: social relationships as a symptom predictor. *Am J Psychiatry* 1991;148:1200–1205.
17. Boxer PA. Occupational mass psychogenic illness. *J Occup Med* 1985;27:867–872.
18. Moss PD, McEvedy CP. An epidemic of overbreathing among schoolgirls. *Brit Med J* 1966;2:1295–1300.
19. Smith HCT, Eastman EJ. Outbreak of abdominal pain. *Lancet* 1973;2:956–958.
20. Tracy JK, Oldach D, Greenberg DG, Grattan LM. Psychological adjustment of watermen with suspected exposure to *Pfiesteria* piscicida. *Md Med J* 1998;47:130–132.
21. Knight JA, Friedman TI, Sulianti J. Epidemic hysteria: A field study. *Am J Public Health* 1965;55:858–865.
22. Colligan MJ, Pennebaker JW, Murphy LR (eds): *Mass Psychogenic Illness*. Hillsdale, NJ: Lawrence Erlbaum Associates, 1982.
23. Small GW. Mass media and mass hysteria. *Am J Psychiatry* 1986;143:395–396.
24. Faust HS, Brilliant LB. Is the diagnosis of "mass hysteria" an excuse for incomplete investigations of low level environmental contamination? *J Occup Med* 1981;23:22–26. ■

Pfiesteria in Maryland: preliminary epidemiologic findings

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ABSTRACT: *In the fall of 1996, fish kills in Maryland rivers were attributed to the dinoflagellate,* Pfiesteria piscicida. *After a group of researchers established a potential link between exposure to* Pfiesteria *and an illness causing memory problems, state health authorities closed a portion of the Pocomoke River. To determine the extent of illness, the range of symptoms, potential risk factors for disease, and to provide information to concerned citizens, a toll-free hotline was created. All symptomatic persons who called the toll-free number were administered a standardized questionnaire. Persons who had been exposed to* Pfiesteria *or* Pfiesteria*-laden waters were more likely to have respiratory, neurologic, dermatologic, and gastrointestinal problems than those persons without exposure. Among the persons calling the hotline, many had extensive neuropsychologic testing. Of the neuropsychologic test battery, low scores on the Rey Auditory Verbal Learning Test (RAVLT) , a standardized measure of learning and memory, best characterized illness related to* Pfiesteria *exposure. Patients with low RAVLT scores were more likely to have neurologic symptoms and skin lesions than control subjects. Low RAVLT scores were associated with fishing (OR, 9.00, 95% CI, 1.06, 409.87), catching fish with lesions (OR, 6.17, 95% CI 1.27, 32.10), and handling fish with lesions (OR, 5.34, 95% CI, 1.05, 29.92) but not with consumption of seafood. While preliminary, these results do suggest that some risk factors for* Pfiesteria*-related illness may be easy to modify and used to prevent unnecessary human exposure.*

Pfiesteria piscicida and other *Pfiesteria*-like dinoflagellates have been identified as causative agents in fish kills from the mid-Atlantic to the southeastern United States.[1] In 1992, *P. piscicida* was identified in the Choptank River on the Eastern Shore of Maryland.[2] No human health problems were documented. In the fall of 1996, watermen fishing the Pocomoke River and Sound began complaining of health problems. The complaints became more widespread and more serious in the spring of 1997.[3] The watermen associated their symptoms with exposure to fish kills. Because of public concern about the safety of Maryland waters and seafood, the Maryland Department of Health and Mental Hygiene (DHMH) formed a team of physician researchers and neuropsychologists from the University of Maryland and Johns Hopkins University schools of medicine. This team was charged with investigating the reported illnesses in a group of 13 watermen exposed to *Pfiesteria*-laden waters and 8 oceanside watermen. After finding illness and neuropsychological abnormalities in exposed watermen, a toll-free hotline was created and manned to determine the spectrum of illness and potential risk factors for developing illness, and to provide a service to the people of Maryland. This report describes the development of the hotline and reports the data collected during the Maryland *Pfiesteria* experience.

TABLE 1. CDC criteria for possible *Pfiesteria*-related illness[8]

A. **Exposure criteria**

Exposure to estuarine water characterized by one of the following:

1. Fish with lesions consistent with *P. piscicida* or morphologically related organism (MRO) toxicity (20% of at least 50 fish of one species having lesions)

OR

2. A fish kill with lesions consistent with *Pfiesteria* or MRO toxicity

OR

3. A fish kill involving fish without lesions, if *Pfiesteria* or MROs are present and there is no alternative reason for a fish kill.

AND

B. **Clinical symptoms**

Reporting of the following signs or symptoms:

1. memory loss OR
2. confusion OR
3. acute skin burning (upon direct contact with water) OR
4. 3 or more of the following:
   - headaches
   - skin rash
   - eye irritation
   - upper respiratory irritation
   - muscle cramps
   - gastrointestinal complaints (including nausea, vomiting, diarrhea, and/or abdominal cramps)

Background

Maryland's findings linking human illness to exposure to *Pfiesteria* laden waters were contrary to other studies. Notably, in an unpublished report, Dr. Peter Morris[4] of the North Carolina Department of Environment, Health and Natural Resources, did not establish a causal association between *Pfiesteria* exposure and reported symptoms in persons present at three North Carolina fish kills. Dr. Morris and colleagues found an alternative explanation for the symptoms reported in the exposed persons. In one case, human symptoms were consistent with hydrogen sulfide exposure in six of the seven persons interviewed. In another case, preexisting conditions may explain the abnormal neuropsychologic test results, while those with normal test results were tested long after their exposure.

On the other hand, Glasgow reported severe respiratory and neurological problems after laboratory exposures to *Pfiesteria* and/or its toxins.[5] The researchers exposed to the toxic organism reported fogginess, emotional changes, and skin lesions, which slowly resolved (one to two years) once the exposure to *P. piscicida* was eliminated.

Methods

Hotline. The toll-free hotline was established and supervised by the medical team and was operated by students from the Johns Hopkins University School of Hygiene and Public Health between August 30 and September 14, 1997. The hotline was advertised on television, in newspapers, and on the worldwide web. Students were briefed about *Pfiesteria*, its associations with fish kills, symptoms reported in the literature, and the medical team's findings. All calls reporting a fish kill or citing fish with lesions were directed to the Maryland Department of Natural Resources hotline. Students recorded each call into a log.

Questionnaire. Those callers who met criteria (possible exposure to waters with fish kills, suspected symptoms, or seafood consumption) answered a standard questionnaire. We collected demographic information, signs and symptoms (including respiratory, dermatologic, neurologic and gastrointestinal symptoms) and potential exposure routes (including exposure to fish-kills, handling of fish with lesions, and seafood consumption). Symptom questions in-

cluded those described by watermen with *Pfiesteria* exposure and those associated with exposure to other toxic plankton, ciguatera fish poisoning, amnestic, paralytic, and neurotoxic shellfish poisonings.

Additional exposed and nonexposed persons and follow-up

Once the hotline responsibilities were transferred to the Maryland Department of Mental Health and Hygiene, any additional persons exposed (or possibly exposed) to *Pfiesteria*-laden waters were identified by the medical team and interviewed. Subjects not exposed to *Pfiesteria*-laden waters were recruited from a group of oceanside watermen. All persons reporting neurologic symptoms who were exposed to *Pfiesteria*-laden waters or fish kills, and all control subjects were referred for neuropsychologic testing.

Definitions of illness

Pfiesteria-related illness was defined using the Centers for Disease Control and Prevention (CDC) criteria developed by a consensus conference (**Table 1**) or based on abnormal scores of the final learning trial (trial 5) of the Rey Auditory Verbal Learning Test (RAVLT), a word list learning task. For these analyses, *Pfiesteria*-related illness required meeting the CDC criteria or scoring less than or equal to the 10th percentile for appropriate population based age, sex, and occupation matched norms on trial 5 of the RAVLT. A score less than the 10th percentile is considered impaired in persons with average premorbid levels of cognitive functioning and discriminated between exposed and nonexposed persons.[7]

Data management/statistics

All questionnaires were entered and analyzed using EpiInfo 6.0 (Centers for Disease Control and Prevention, Atlanta, Georgia). We excluded questionnaires from callers who lacked both a potential exposure and symptoms reflecting contact with *Pfiesteria* or fish-killed waters. Thus, callers who had symptoms and whose exposures occurred in estuarine waters in the absence of known *Pfiesteria*-related fish kills were included. Categorical data were analyzed using Fisher's exact and chi-square tests and continuous variables were analyzed using Student's *t* test. All tests were 2-tailed. Appropriate odds ratios (OR) and 95% confidence intervals (CI) were calculated. Analyses excluded individuals with missing data.

Analyses were stratified into three distinct groups: 1) callers who met the CDC criteria[8] (**Table 1**), 2) self-referred exposed persons with symptoms and recruited unexposed individuals, and 3) persons with RAVLT scores less than the 10th percentile.

Results

Hotline/database. Sixty-eight hotline calls were answered.

TABLE 2a. Characteristics of persons meeting and not meeting the CDC criteria[1]

Characteristic[2]		Meets CDC criteria (% of n) n=32	Does not meet CDC criteria (% of n) n=34	p Value[4]
Gender	Male	24 (75%)	31 (91%)	0.10
	Female	8 (25%)	3 (9%)	
Race	White	30 (97%)	31 (94%)	1.00
	Black	1 (3%)	2 (6%)	
Age	Mean (SD)	.5 (10.4)	39.2 (9.8)	0.34[5]
Respiratory symptoms[3]	Yes	23 (72%)	14 (41%)	*
	No	9 (28%)	20 (59%)	
Neurological symptoms[3]	Yes	28 (88%)	19 (56%)	*
	No	4 (12%)	15 (44%)	
Dermatological symptoms[3]	Yes	19 (59%)	12 (35%)	*
	No	13 (41%)	22 (65%)	
Gastrointestinal symptoms[3]	Yes	21 (66%)	7 (21%)	*
	No	11 (34%)	27 (79%)	
General symptoms[3]	Yes	28 (88%)	16 (47%)	<0.001
	No	4 (12%)	18 (53%)	

1 Excluding 5 individuals with history of head injury, neurologic problems, or malingering profiles
2 Contains only those with complete data
3 Based on the presence of two or more symptoms per category. (Respiratory symptoms=wheezing, shortness of breath, coughing, upper reparatory irritation, and stuffy nose: Neurological symptoms=headache, difficulty recalling words, memory loss, confusion/disorientation, difficulty concentrating, dizziness, irritability, and hallucinations: Dermatologic symptoms=rash at sites of water contact, sores at sites of water contact, skin burning on contact with water, and itchy skin at sites of water contact, Gastrointestinal symptoms=nausea, vomiting, crampy abdominal pain, and diarrhea, General symptoms=fever, chills, muscle aches/spasms, joint pain, and fatigue)
4 p values are based on Fisher's Exact chi-square 2-tailed test unless specified
5 p value based on the Student's *t* test
*Because symptoms were included in the CDC criteria, no statistical analyses were performed

TABLE 2b. Characteristics of self-referred and unexposed persons[1]

Characteristic[2]		Self-referred ill persons (% of n) n=48	Unexposed (% of n) n=18	p Value[4]
Gender	Male	40 (83%)	15 (83%)	1.00
	Female	8 (17%)	3 (17%)	
Race	White	45 (98%)	16 (89%)	0.18
	Black	1 (2%)	2 (11%)	
Age	Mean (SD)	40.5 (11.1)	39.7 (6.8)	0.77[5]
Respiratory symptoms[3]	Yes	33 (69%)	4 (22%)	<0.001
	No	15 (31%)	14 (78%)	
Neurological symptoms[3]	Yes	42 (88%)	5 (28%)	<0.001
	No	6 (12%)	13 (72%)	
Dermatological symptoms[3]	Yes	30 (63%)	1 (6%)	<0.001
	No	18 (37%)	17 (94%)	
Gastrointestinal symptoms[3]	Yes	27 (56%)	1 (6%)	<0.001
	No	21 (44%)	17 (94%)	
General symptoms[3]	Yes	39 (81%)	5 (28%)	<0.001
	No	9 (19%)	13 (72%)	

1 Excluding 5 individuals with history of head injury, neurologic problems or malingering profiles
2 Contains only those with complete data
3 Based on the presence of two or more symptoms per category. (Respiratory symptoms=wheezing, shortness of breath, coughing, upper reparatory irritation, and stuffy nose: Neurologic symptoms=headache, difficulty recalling words, memory loss, confusion/disorientation, difficulty concentrating, dizziness, irritability, and hallucinations, Dermatologic symptoms=rash at sites of water contact, sores at sites of water contact, skin burning on contact with water, and itchy skin at sites of water contact, Gastrointestinal symptoms=nausea, vomiting, crampy abdominal pain, and diarrhea, General symptoms=fever, chills, muscle aches/spasms, joint pain, and fatigue)
4 p values are based on Fisher's Exact chi-square 2-tailed test unless specified
5 p value based on the Student's *t* test

Thirty-six calls were questions about the organism, *Pfiesteria*, and 32 were about human health and required a questionnaire to be administered. We collected data on an additional 21 suspected cases that were referred by the medical team. Eighteen nonexposed persons were interviewed. Of the 71 persons in the database, five were excluded because they had a premorbid illness that could have accounted for their symptoms or low RAVLT scores, or they had a malingering profile on neuropsychologic testing. Further analyses are based on 66 persons.

Illness. Thirty-two of the 66 participants met CDC criteria. Forty-eight persons, of whom 32 met CDC criteria and 16 did not, were self-referred to the hotline or the medical team. Fifty-two of 66 persons, including all 18 unexposed persons agreed to neuropsychologic testing. All 18 unexposed subjects, and 21 others, scored within the normal range on the RAVLT. Thirteen participants scored below the 10th percentile on the RAVLT. Of the 32 individuals meeting the CDC criteria, 25 underwent neuropsychologic testing and 11 scored below the 10th percentile on the RAVLT. Two of the nine exposed persons did not meet the CDC criteria, and scored below the 10th percentile on the RAVLT.

Characteristics. Persons meeting the CDC criteria had similar gender, age, and race to those persons with illness who did not meet the CDC criteria (**Table 2a**). Self-referred persons were similar in gender, age and race to the recruited non-exposed persons (**Table 2b**), and were more likely to have symptoms (all categories, p value, <0.001).

Individuals with RAVLT scores below the 10th percentile were similar in gender, race, and age to those with normal RAVLT scores (**Table 2c**). With the exception of gastrointestinal symptoms (p value, 0.52), those with abnormal neuropsychologic test scores experienced more symptoms than those with normal scores (all categories, p values, <0.001).

Predictive values. The sensitivity and specificity of the CDC criteria was calculated using RAVLT scores less than the 10th percentile as the most reliable measure of illness. To determine whether the CDC criteria identify patients with low RAVLT, we determined the proportion of people who met the CDC criteria and compared them to those who had low RAVLT scores (positive predictive value [PPV]). We determined whether the CDC criteria predict which persons will have RAVLT scores comparable to age and gender-matched norms and are free of disease (negative predictive value [NPV]).

The sensitivity of the CDC criteria was 85% (11/13) and the specificity is 64% (25/39). The CDC criteria only identified 44.0% (PPV=11/25) of persons with RAVLT

scores less than the 10th percentile. The CDC criteria correctly identified 92.6% (25/27) of people who did not have disease (negative predictive value [NPV]) using abnormal RAVLT scores. When unexposed persons were excluded, the NPV falls to 77.7%, while the PPV remains the same.

Activities. The risk of developing illness is shown for all three groups of illness: those defined by CDC criteria, those patients identifying symptoms themselves, and those persons with abnormal RAVLT tests (**Table 3**). We report the latter category. Ingestion of seafood (OR, 1.07, 95% CI 0.19, 6.49), swimming (OR, 0.62, 95% CI, 0.13, 2.84), and boating (OR, 1.00, 95% CI 0.07, 57.21) were not statistically associated with illness characterized by low RAVLT scores. Fishing (OR, 9.00, 95% CI, 1.06, 409.87), handling fish with lesions (OR, 6.17, 95% CI, 1.27, 32.10), and catching fish with lesions (OR, 5.34, 95% CI, 1.05, 29.92) were activities that placed persons at a significantly greater likelihood of developing illness. Those individuals who used gloves while handling fish with lesions may reduce the risk of developing abnormal RAVLT scores (OR, 2.33, 95% CI, 0.36, 16.14).

TABLE 2c. Characteristics of persons with and without illness stratified by RAVLT scores[1,2]

Characteristic[3]		RAVLT <10th percentile (% of n) n=13	RAVLT >10th percentile (% of n) n=39	p Value[5]
Gender	Male	9 (69%)	33 (85%)	0.24
	Female	4 (31%)	6 (15%)	
Race	White	13 (100%)	36 (92%)	0.56
	Black	0 (0%)	3 (8%)	
Age	Mean (SD)	42.5 (10.5)	38.3 (9.5)	0.19[6]
Respiratory symptoms[4]	Yes	12 (92%)	19 (49%)	0.008
	No	1 (8%)	20 (51%)	
Neurologic symptoms[4]	Yes	13 (100%)	23 (59%)	0.005
	No	0 (0%)	16 (41%)	
Dermatologic symptoms[4]	Yes	10 (77%)	12 (31%)	0.008
	No	3 (23%)	27 (69%)	
Gastrointestinal symptoms[4]	Yes	7 (54%)	16 (41%)	0.52
	No	6 (46%)	23 (59%)	
General Symptoms[4]	Yes	12 (92%)	23 (59%)	0.039
	No	1 (8%)	16 (41%)	

Note: RAVLT refers to the Rey Auditory Verbal Learning Test
1 Gold Standard disease is defined as scoring less than or equal to the 10th percentile on the RAVLT
2 Excluding 5 individuals with history of head injury, neurologic problems or malingering profiles
3 Contains only those with complete data. (Respiratory symptoms=wheezing, shortness of breath, coughing, upper reparatory irritation, and stuffy nose: Neurological symptoms=headache, difficulty recalling words, memory loss, confusion/disorientation, difficulty concentrating, dizziness, irritability, and hallucinations: Dermatologic symptoms=rash at sites of water contact, sores at sites of water contact, skin burning on contact with water, and itchy skin at sites of water contact: Gastrointestinal symptoms=nausea, vomiting, crampy abdominal pain, and diarrhea: General symptoms=fever, chills, muscle aches/spasms, joint pain, and fatigue)
4 Based on the presence of two or more symptoms per category
5 p values are based on Fisher's Exact chi-square 2-tailed test unless specified
6 p value based on the Student's *t* test

Discussion

The hotline was a logical and instrumental response to help public health officials determine the extent of *Pfiesteria* illness in Maryland, but it was also important in answering the myriad of questions asked by the public. This hotline addressed the concerns of the many potentially affected persons in a methodical and expedient fashion.

Our findings support the report of the medical team.[8] When we used an abnormal RAVLT (less than the 10th percentile) as the most characteristic finding of *Pfiesteria*-related illness, persons exposed to *Pfiesteria* or *Pfiesteria*-laden waters are at increased risk of developing respiratory, neurologic, dermatologic, and gastrointestinal symptoms.

Interestingly, the low positive predictive value (44.0%) and specificity (64%) suggest that the CDC criteria did not help us identify true *Pfiesteria*-related illness. However, the high negative predictive value (92.6%) suggests that the CDC criteria can correctly identify those without illness. Such criteria will help public health officials identify those persons unlikely to have an illness related to *Pfiesteria* or related organisms. On the other hand, the CDC criteria have limited applicability because they require an exposure to either *Pfiesteria* or a *Pfiesteria*-caused fish kill.

TABLE 3. Odds ratios for participation in selected activities

Activity	Meets CDC criteria[1] (OR, 95% CI)[4] (n)	Self-referred[2] (OR, 95% CI)[4] (n)	Persons with RAVLT < 10th % ile[3](OR, 95% CI)[4] (n)
Swimming	0.63 (0.20, 2.00) (63)	0.47 (0.13, 1.72) (63)	0.62 (0.13, 2.84) (49)
Fishing	2.82 (0.83, 9.87) (62)	2.54 (0.68, 9.63) (62)	9.00 (1.06, 409.87) (48)
Boating	5.77 (0.58, 281.76) (62)	3.67 (0.42, 30.27) (62)	1.00 (0.07, 57.21) (48)
Caught fish with lesions	3.99 (1.17, 14.07) (61)	15.68 (2.00, 688.19) (61)	6.17 (1.27, 32.10) (47)
Handled fish with lesions	2.42 (0.69, 8.75) (53)	0.002[5] (53)	5.34 (1.05, 29.92) (40)
Used gloves when handling fish with lesions	2.33 (0.40, 14.35) (33)	0.20[5] (33)	(33) (0.36, 16.14) (25)
Ate shellfish	0.60 (0.17, 2.13) (53)	0.31 (0.06, 1.49) (53)	1.07 (0.19, 6.49) (45)
Ate oysters	1.63 (0.46, 5.82) (50)	0.54 (0.13, 2.22) (50)	1.50 (0.29, 8.02) (42)
Ate clams	0.37 (0.10, 1.35) (50)	0.31 (0.04, 1.35) (50)	0.59 (0.11, 3.04) (42)
Ate crabs	0.70 (0.17, 2.90) (53)	0.38 (0.05, 2.29) (53)	2.67 (0.26, 64.73) (45)

1 Compared to persons not meeting CDC criteria
2 Compared to nonexposed persons
3 Compared to those persons scoring within normal RAVLT ranges
4 95% confidence intervals calculated using Cornfield or, when cells less than 5, Fisher's Exact tests
5 Undefined ORs, thus, p values for Fisher's exact chi-square two-sided test are provided

Our database did allow us to examine whether some exposures were linked with abnormal RAVLT scores and illness. Most importantly, we found that ingestion of clams, oysters, crabs, and other shellfish were not associated with illness. Fishing, catching, and/or handling fish with lesions did increase the risk of disease. Our data show that ingestion is not an important mechanism of transmission. However, most fish exhibiting lesions were menhaden, a species not typically used for food in the United States. Direct contact or inhalation of volatile toxins found in *Pfiesteria*-laden waters may explain why fishing and catching fish with lesions were risk factors for disease but boating was not. In fact, our data show that the odds of developing illness decreased by half if persons used gloves when they handled fish with lesions. Surprisingly, swimming was not associated with an elevated risk of developing disease but our sample limited our ability to accurately assess this activity. Furthermore, swimming and boating are activities that were not limited to *Pfiesteria*-laden waters such as the Pocomoke River.

Our data, while interesting, must be interpreted cautiously. First of all, we report a nonrandom collection of persons who called into a hotline or medical experts. This selected sample may report the more severe spectrum of illness. Secondly, we collected data on standardized questionnaires and we were limited by our knowledge of the illness at the time. Hence, important symptoms or exposures may not have been captured completely. Furthermore, the role of media attention in this potential public health problem is minimally known.

Does *Pfiesteria* exposure cause harmful human health effects? While this appears to be a simple question, the answer remains elusive. Our results suggest that persons with certain types of exposures to *Pfiesteria*-laden waters are at an increased risk of developing *Pfiesteria* related symptoms and neurologic problems. Importantly, some of these exposures can be easily modified and may decrease the risk of developing illness. We are encouraged that the CDC criteria accurately identify persons without *Pfiesteria*-related illness, however, at this point no easy screening

criteria identify persons with disease. In our opinion, neuropsychologic testing is the gold standard until other methods are validated. Further research is needed to clarify how to define *Pfiesteria*-related illness, and determine what host, environmental, and occupational/recreational activities increase the risk of disease.

Acknowledgments

The authors express their sincere gratitude to the remaining members of the medical team, Patricia Charache, M.D., Mark Lowitt, M.D., and J. Glenn Morris, M.D., M.P.H. & T.M., for their leadership. We thank Kate Tracy, B.A., and Deborah Greenberg, M.A., for their assistance with neuropsychologic testing, and all the students at Johns Hopkins School of Hygiene and Public Health who generously volunteered their time to staff the hotline.

References

1. Burkholder JM, Glasgow HB. Trophic controls on stage transformation of a toxic ambush-predator dinoflagellate. *J Euk Microbiol* 1997;44:200–205.
2. Lewitus AG, Jesien RV, Kana TM, et al. Discovery of the "phantom" dinoflagellate in the Chesapeake Bay. *Estuaries* 1995;18:373–378.
3. Morris JG, Charache PA, Grattan LM, et al. Medical evaluation of persons with exposure to water containing *Pfiesteria* or *Pfiesteria*-like dinoflagellates. Interim Report to Secretary Wasserman, Maryland Department of Health and Mental Hygiene. 1997.
4. Morris PD. Acute symptoms reported by persons exposed to fish kills associated with *Pfiesteria* piscicida. North Carolina Department of Environment, Health, and Natural Resources, 1996.
5. Glasgow HB, Burkholder JM, Schmechel DE, et al. Insidious effects of a toxic estuarine dinoflagellate on fish survival and human health. *J Toxicol Environ Health* 1994;46: 501–522.
6. Levin ED, Schmechel DE, Burkholder JM, et al. Persisting learning deficits in rats after exposure to *Pfiesteria piscicida*. *Environ Health Perspect* 1997;105:2–7.
7. Grattan LM, Oldach D, Perl TM, et al. Problems in learning and memory occur in persons with environmental exposure to waterways containing toxin-producing *Pfiesteria* or *Pfiesteria*-like dinoflagellates. (Under review).
8. CDC. Results of the Public Health Response to *Pfiesteria* Workshop-Atlanta Georgia, September 29-30, 1997. *MMWR* 1997;46:951–952. ■

Toxic *Pfiesteria* — surveillance for human disease in Maryland

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ABSTRACT: *The presence of toxic stages of the dinoflagellate* Pfiesteria piscicida *and other morphologically related organisms was documented in three estuarine waterways on the lower Eastern Shore of Maryland in 1997. The Maryland Department of Health and Mental Hygiene, working closely with the local health departments, established a surveillance system to collect reports of human illnesses. Maryland's experience has formed the base on which national surveillance criteria for Estuary Associated Syndrome have been developed and regional surveillance protocols have been built. The cooperation of practicing physicians is essential to continued surveillance efforts to further delineate the extent and nature of human health effects following exposures to waters where toxic forms of these dinoflagellates are active. Physicians wishing to report persons who may have Estuary Associated Syndrome should contact their local health department. Persons wanting information or wishing to report finding lesioned fish or a fish kill in progress should call the Maryland* Pfiesteria *Hotline at 1-888-584-3110.*

A great deal has been written over the past 6 to 12 months on Maryland's experience with blooms of a toxic dinoflagellate, *Pfiesteria piscicida*, and other morphologically related organisms (MROs), which were confirmed in waterways that experienced fish lesion/kill events

in 1997.[1] The Maryland experience, detailed in a previous article published in the *Maryland Medical Journal*, has served as a base on which national surveillance criteria have been built.[2,3] This article summarizes the results of last year's surveillance efforts in Maryland and describes planned future surveillance activities.

Summary of 1997 surveillance

In June 1997, the Department of Health and Mental Hygiene (DHMH) established a surveillance system, working closely with local health departments, to collect reports of human illness thought to be related to exposure to fish with lesions or the waters from which they were taken. From June through December 1997, DHMH received a total of 156 reports of persons with illnesses. Of these reports, 37 met the Centers for Disease Control and Prevention (CDC) surveillance criteria as described in the October 1997 *Morbidity and Mortality Weekly Report*.[3] The dominant symptom, memory loss, was reported by 23 of the 37 persons.

Maryland's EAS surveillance system — 1998

In a series of meetings convened in January 1998, representatives of seven mid-Atlantic and southeast coastal states (Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, and Florida) and the CDC reviewed the existing data on possible human health effects related to environmental exposures to estuarine water that showed evidence of toxic activity of *P. piscicida* and MROs, and laboratory exposures to toxic cultures of *P. piscicida*. While *P. piscicida* was identified in samples taken during fish kills in Maryland, other dinoflagellates were also identified.[1] While the Maryland Medical Team, a medical diagnostic team led by Dr. J. Glenn Morris of the University of Maryland, did find human health effects in the form of difficulties in learning and memory, which were temporally and geographically related to fish health events on the lower Pocomoke River,[4] the extent, nature, and duration of exposure remain largely undefined. The toxins produced have not as yet been characterized nor measured in the environment. The full nature, extent, and duration of the possible human health effects remain to be determined. Because it is not currently possible to measure these toxins in the environment or in human tissues, and because exposures can only be crudely estimated in terms of observable fish health effects, the multistate group wished to keep the surveillance criteria broad enough to include subtle exposures. The multistate group was also reluctant to label illnesses as related to only one toxin-producing organism since we could not be certain which toxin or combination of toxins was responsible for the effects seen. Thus, the term Estuary Associated Syndrome (EAS) was settled on for use in surveillance efforts in all participating states.

TABLE 1. Consensus surveillance criteria - Estuary Associated Syndrome -1998

Exposure criteria

Exposure to estuarine water characterized by:

- fish with lesions consistent with *P. piscicida* or morphologically related organism (MRO) toxicity (20 percent of a sample of at least 50 fish of one species having lesions)

or

- a fish kill involving fish with lesions consistent with *P. piscicida* or MRO toxicity

or

- a fish kill involving fish without lesions, if *P. piscicida* or MROs are present and there is no alternative reason for the fish kill.

or

- a documented event with fish displaying aberrant behavior consistent with *P. piscicida*

Clinical criteria

- Memory loss

or

- Confusion

or

- Three or more of the following signs or symptoms:
  - Headache
  - Upper respiratory irritation
  - Skin rash
  - Muscle cramps
  - Eye irritation
  - Gastrointestinal complaints (i.e., nausea, vomiting, diarrhea, and/or abdominal cramps)
  - Acute burning sensation of skin on contact with estuarine water

The surveillance criteria for the newly defined EAS are listed in **Table 1**. An estuary is generally defined as a coastal area at the mouth of a river where fresh water mixes with salt water. The Chesapeake Bay is the largest estuary in the United States; its tributaries, subject to tidal action, are also estuarine in nature. The surveillance criteria are a combined set of environmental exposure definitions and clinical features. Both components must be present in order for a report to meet the surveillance criteria. Because there are no definitive biomarkers or laboratory tests for diagnosing exposure to toxic *Pfiesteria* or other MROs, EAS remains a

diagnosis of exclusion. Persons who have other diagnosed conditions that may account for their symptoms will not be judged as meeting the surveillance criteria. Maryland's surveillance system for EAS will remain firmly based in local health departments. A listing of local health department contacts is provided in **Table 2**.

TABLE 2. Local health department contacts

County	Communicable disease contact person	Phone no.	Directors of nursing	Phone no.
Allegany	Mary Tola	301-777-5666	Sue Ottmar	301-777-5666
Anne Arundel	Loretta Gossett	410-222-7256	Theresa Hommel	410-222-7136
Baltimore	Ruth Thompson	410-887-2724	Pearl Holland	410-887-2705
Calvert	B. Buchheister	410-535-5400	Contact: B. Buchheister	410-535-5400
Caroline	Dawn Knox	410-479-2860	Sandy Keating	410-479-0556
Carroll	Eleanor Derstine	410-876-4936	Donna Hopkins	410-876-4920
Cecil	Paulette Husfelt	410-996-5100	Andrea Heddin	410-996-5130
Charles	Jeannie Biscoe	301-934-9577	Graceanne Guy	301-934-9377
Dorchester	Lisa Lee	410-228-3223	None	410-228-3223
Frederick	Stephanie Steinbart	301-631-3352	Ellen Ristorcelli	301-694-2165
Garrett	Erick Cvetnick	301-334-8111	Norma Bolding	301-334-8116
Harford	Kay Kearns	410-838-3047	Linda Stevens	410-638-8471
Howard	Dr. Willa Brown	410-313-6109	Victoria Duke, Acting	410-313-7500
	Marilyn Schubert	410-313-7500		
Kent	Peggy Clothier	410-778-1350	Maryland Massey	410-778-7049
Montgomery	Tina Lacey	301-217-1755	Judy Covich	301-217-1550
Prince George's	Mercedes Lawrence	301-386-0110	Mary Joyce	301-883-7844
	(Acting)	301-883-7868		
Queen Anne's	Mary A. Thompson	410-758-0720	Kate Tumulty	410-758-0720
St. Mary's	Diane McKinney	301-475-4316	Nancy Luginbill	301-475-4330
Somerset	Patti Beauchamp	410-651-5650	Colleen Parrott	410-651-5620
Talbot	Susan Sullivan	410-822-2292	Kathy Foster	410-822-2292
Washington	Mary C. Mahon	301-791-3231	Linda Humbert	301-791-3290
Wicomico	Brenda Williams	410-543-6943	Joan Scott	410-543-6941
Worcester	Debra Stephens	410-632-1100	Rebecca Shockley	410-352-3234
Baltimore City	Dick Dunning	410-396-4436	Bernadette Greene	410-396-4522

Figure 1 shows the basic surveillance algorithm for Maryland. Level one interviews will occur at the point of first contact, usually the hotline or the local health department. In this phase, we will seek to establish whether an individual has symptoms consistent with EAS and has had exposure to estuarine water with or without evidence of toxic activity of *Pfiesteria* or an MRO. All callers will be given appropriate information. Anyone having symptoms will be referred to his or her physician for evaluation and treatment. If the person is asymptomatic or has not had an exposure to estuarine water, appropriate information and referrals will be given.

Only persons with symptoms consistent with EAS and exposure to estuarine water will proceed to the next level screening. The second level of the surveillance system will be managed by service coordinators located regionally in conjunction with local health departments. The Maryland Medical Team has prepared recommendations on evaluating various symptom complexes such as neurologic or dermatologic symptoms. Service coordinators will contact the individual to obtain detailed exposure information and seek permission to work with his or her physician. The service coordinator will provide copies of evaluation protocols to physicians and gather information on results of medical evaluations. When no other medical condition that may account for neurocognitive symptoms has been diagnosed, the service coordinator may refer the person to the medical team for neurocognitive testing. Referrals to the medical team will be through the service coordinators and, in general, limited to persons who, having had appropriate initial medical evaluations by their own physicians, have no diagnosed condition that may account for their

symptoms. Therefore, the practicing physician remains a linchpin in our disease detection network. Further information regarding EAS, evaluation protocols, and *P. piscicida* and MROs may be obtained by calling your local health department at the number listed in Table 2 or DHMH at 410-767-6700.

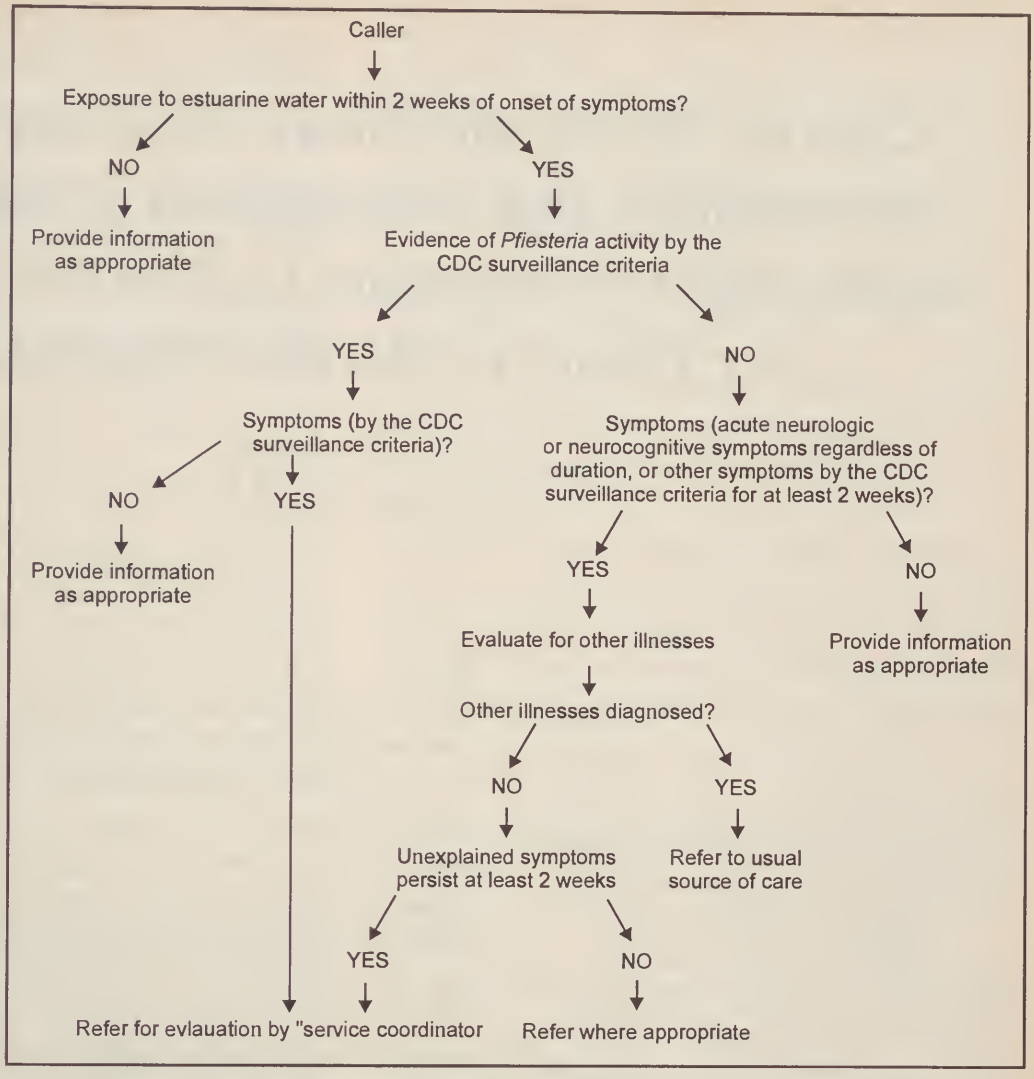

FIGURE 1. Algorithm for surveillance of Estuary Associated Syndrome: screening level 1

Environmental surveillance plan

Dr. Robert Magnien and Mr. Harley Speir of the Maryland Department of Natural Resources have developed a comprehensive plan to monitor fish health and water quality parameters in Maryland estuarine waters in 1998.[5] The plan includes four levels of monitoring in response to the threat of toxic dinoflagellate activity. Level I is a rapid response to reports of fish health events to determine the nature of the fish health problem and to evaluate for possible involvement of *Pfiesteria* or related organisms. Level II involves the comprehensive monitoring of waterways that were affected in 1997 (the lower Pocomoke River, King's Creek, and the Chicamacomico River) for fish health and water quality parameters. Level III includes proactive comprehensive monitoring of several waterways that share similar characteristics to the waterways affected in 1997. Level IV continues all the water quality measurements previously collected and followed in the Chesapeake Bay in recent years.

All the environmental data will be coded for geographical location (geocoded). We will also geocode exposure locations in the surveillance database. This will allow linkage of reports of exposures to estuarine waters to sampling results from environmental monitoring to better delineate the types and temporal relationships of exposures and human health effects.

References

1. Maryland Department of Natural Resources. Summary of Maryland *Pfiesteria* sampling and results: August 1, 1997 - October 28, 1997.
2. Matuszak DL, Sanders M, Taylor JL, Wasserman MP. Toxic *Pfiesteria* and human health. *Md Med J* 1997;46:515–520.
3. Centers for Disease Control and Prevention. Results of the public health response to *Pfiesteria* workshop - Atlanta, Georgia, September 29-30, 1997. *MMWR* 1997;46:951–952.
4. Morris JG, Charache PA, Grattan LM, et al. Medical evaluation of persons with exposure to water containing *Pfiesteria* or *Pfiesteria*-like dinoflagellates. Interim Report to Secretary Wasserman, Maryland Department of Health and Mental Hygiene, 1997.
5. Magnien R, Speir H. Fish health, habitat quality, and *Pfiesteria* surveillance in support of Maryland's response to toxic outbreaks of *Pfiesteria* and similar dinoflagellates. Maryland Department of Natural Resources, 1998. ■

Current status and future directions for the investigation and management of the human health effects of exposure to *Pfiesteria piscicida* or *Pfiesteria*-like dinoflagellates

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The articles in this issue of the *Maryland Medical Journal* highlight the knowledge gained regarding the toxic dinoflagellate *Pfiesteria piscicida* and its potential effects on our waterways, fish, and persons in Maryland during our first year of investigation. All of the authors in this issue use the term *Pfiesteria* generically. We recognize that the emerging pathogen to which we attribute fish disease and human health effects may be a *Pfiesteria*-like dinoflagellate or morphologically related organism. With this in mind, the findings presented in this special issue of the *Maryland Medical Journal* provide some preliminary guidance for the prevention, prognosis, and treatment of a newly identified clinical syndrome. Moreover, they will guide our ongoing scientific investigations.

Prevention

Based upon our current knowledge, the best way to minimize a person's risk for a *Pfiesteria*-related syndrome is to avoid exposure to waterways with toxic *Pfiesteria* or morphologically related organisms (MROs). As Matuszak et al. pointed out, the Maryland Department of Natural Resources has developed a comprehensive surveillance program for monitoring threats of toxic dinoflagellate activity in Maryland waterways.[1] The public will be immediately advised if levels of toxic *Pfiesteria* or MRO activity are potentially harmful and persons may choose to avoid these affected waterways. The findings of Golub et al., suggest that dermal contact with affected fish and water increases ones risk for illness and wearing protective gloves may reduce the risk of adverse health effects.[2] This precaution may be sufficient if the primary and exclusive route of entry into the human body is dermal. However, other routes of entry may potentially exist, such as inhalation.[3,4] Therefore, these preliminary data, albeit potentially useful, need to be interpreted with caution. Ongoing

research by the Maryland Medical Team and others is in progress to identify the most effective prevention strategies.

Prognosis

Studies of persons affected by exposures during the summer of 1997 suggest that spontaneous recovery from dermatological and neuropsychological symptoms may be expected if the exposure is discontinued. The toxic skin reactions identified by Lowitt and Kaufmann[5] appear to improve within 2 to 4 weeks (M. Lowitt, personal communication). The measurable memory and cognitive symptoms of persons with mild to moderate levels of exposure appear to resolve within three months. Persons with the most severe exposures and cognitive disturbances seem to have a two-stage recovery process. First, the person experiences the sudden onset of an acute confusional state which persists for about 12 to 36 hours. This is followed by a period of residual memory and cognitive disturbance which gradually improves over six months. Further prospective studies are underway by our medical team to determine the specific recovery time course of persons with varying levels of exposure.

Interventions

The development of interventions to facilitate a rapid recovery and minimize functional disability are important considerations. However, to date, there are no established scientific or clinical theories regarding the human health effects of *Pfiesteria* exposure to guide medical treatment. From a neuropsychological perspective, there are compensatory strategies for managing attention and memory problems which some symptomatic persons found useful (see the recommendations of Grattan published in Matuzak et al.[6] for review). However, the precise utility of such interventions remains to be empirically determined. A novel medical approach to treatment has been studied by Shoemaker which involves the use of cholestyramine.[7] The efficacy of this treatment approach also needs further study. A primary goal of our medical team and others is to determine the mechanisms through which this putative neurotoxin affects human health. Subsequently, rational and scientifically based treatments may be developed.

Current status and future directions for research

The collection of papers in this special issue provided an overview of important contemporary issues and approaches in understanding the putative human health effects of exposure to *Pfiesteria* or MROs. Kane and his colleagues[8] described the effects of the *Pfiesteria* toxin on fish. The authors' discussion is extremely important to ongoing human health studies because fish with a specific pattern of lesions currently represent the best available marker for identifying toxic activity in estuary waters. The development of more direct means for both organism and toxin identification is a high priority for our basic science investigators. The paper by Oldach, Brown, and Rublec[9] provides the groundwork for such scientific advancement as they discuss the complexity of the organism itself and the subsequent challenge to environmental monitoring. This is particularly important because it is likely there will be a recurrence of this toxic activity in the future.[9]

With such a recurrence, more people could develop *Pfiesteria*-related symptoms and medical and neuropsychologic evaluations may be warranted. Available data suggest that the persons with the most significant health problems to date, that is, the watermen, appear to be otherwise healthy, vigorous persons (see Tracy et al.,[10] for review). Hence, psychiatric factors are probably not contributing to the symptom complaints in this group. Moreover, as Greenberg, Grattan, and Tracy[11] illustrate, allegations of *Pfiesteria* hysteria are not supported by evidence for mass psychogenic illness. Therefore, it is recommended that all reports of *Pfiesteria*-related illness be seriously considered and the symptom complaints be aggressively studied.

Toward this end, the clinical papers of Lowitt and Kaufmann,[5] Bever, Grattan, and Morris,[3] and Grattan et al.[12] all encourage the systematic evaluation of suspect cases and provide general guidelines and direction for such an evaluation. These evaluations revolve largely around dermatologic, neurologic and neuropsychologic examinations as these systems appear to be most affected. To facilitate such evaluations, the paper by Matuszak and colleagues[1] outlines a plan by the state health department for ongoing suspect case surveillance and management.

Golub et al.[2] present preliminary data obtained from the hotline established by the Medical Team and the state health department in 1997. Taking into consideration sampling limitations, they provide preliminary objective data supporting the notion that the *Pfiesteria*-related symptoms are not associated with fish or seafood consumption.

Efforts are underway by the authors of these papers and others toward further advancing knowledge regarding

Pfiesteria and its potential human health effects. This includes identifying methods for organism detection, environmental monitoring, and toxin identification; developing animal models for understanding the mechanisms of this putative neurotoxin; expanding our understanding of the epidemiology of human illness; characterizing the dermatologic, neurologic, and neuropyschologic sequelae of exposure; and defining patterns of illness and recovery.

The state-of-the-art papers in this issue represent the culmination of efforts of community physicians, the Maryland Department of Health and Mental Hygiene, The Maryland Department of Natural Resources, Johns Hopkins University Medical School, and the University of Maryland Medical School. As all of the papers illustrate, our work has just begun and we look forward to continuing our clinical assessments and research in cooperation with physicians throughout the state of Maryland. If the reader needs any further information or is in need of a consultation, please refer to the Resource Guide on page 151.

Acknowledgments

All of the work of the medical team was conducted under the leadership of Dr. Glenn Morris, professor of medicine and chairman of hospital epidemiology at the University of Maryland Medical School. Funding for the human studies was largely provided by the National Institute for Environmental Health Sciences and the Heinz Family Foundation. Special thanks are also extended to Deborah Greenberg, M.A., from the University of Maryland School of Medicine, and Vivian Smith and the editorial board of the MMJ for their diligent efforts coordinating and editing this special issue.

References

1. Matuszak DL, Taylor JL, Dickson C, Benjamin GC. Toxic *Pfiesteria*-surveillance for human disease in Maryland. *Md Med J* 1998;47:144–147.
2. Golub JE, Haselow DT, Hageman JC, et al. *Pfiesteria* in Maryland: Preliminary epidemiological findings. *Md Med J* 1998;47:137–143.
3. Bever CT, Grattan LM, Morris JM. Neurologic evaluation of individuals with encephalopathy after exposure to estuarine waters containing *Pfiesteria*-like organisms. *Md Med J* 1998;47:120–123.
4. Glasgow HB, Jr, Burkholder JM, Schmechel DE, et al. Insidious effects of toxic estuarine dinoflagellate on fish survival and human health. *J Toxicol Environ Health* 1995;46:501–522.
5. Lowitt, MH, Kaufman, CL. *Pfiesteria* and the skin: A practical update for the clinician. *Md Med J* 1998;47:124–126.
6. Matuszak DL, Sanders M, Taylor JL, Wasserman MP. Toxic *Pfiesteria* and human health. *Md Med J* 1997;46:515–520.
7. Shoemaker R. Treatment of persistent *Pfiesteria*-human illness syndrome. *Md Med J* 1998;47:64–66.
8. Kane AS, Oldach D, Reimschuessell R. Fish lesions in the Chesapeake Bay: *Pfiesteria*-like dinoflagellates and other etiologies. *Md Med J* 1998;47:106–112.
9. Oldach D, Brown E, Rublee P. Strategies for environmental monitoring of toxin producing phantom dinoflagellates in the Chesapeake. *Md Med J* 1998;47:113–119.
10. Tracy JK, Oldach D, Greenberg DR, Grattan LM. Psychological adjustment of watermen with exposure to *Pfiesteria piscicida*. *Md Med J* 1998;47:130–132.
11. Greenberg DR, Tracy JK, Grattan LM. A critical review of the "*Pfiesteria hysteria*" hypothesis. *Md Med J* 1998;47:133–136.
12. Grattan LM, Oldach D, Tracy JK, Greenberg DR. Neurobehavioral complaints of symptomatic persons exposed to *Pfiesteria piscicida* or morphologically related organisms. *Md Med J* 1998;47:127–129. ■

RESOURCE GUIDE FOR MARYLAND PHYSICIANS

Suspected case reporting

State Department of Health Hotline: 1-888-258-8989

Internal medicine consultation and evaluation

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Trish Perl, M.D., MSc.
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Baltimore, MD 211287
(410) 955-6479

Community family practice

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Dermatologic examinations and consultation

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Histopathologic evaluation of skin biopsies

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Neurologic consultation and evaluations

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C·M·E·R·C update

The CMERC Update, now in its third year, informs all Med Chi accredited CME sponsors about the activities of the Continuing Medical Education Review Committee (CMERC). The CMERC received feedback (both negative and positive) from our accredited sponsors this past year. This exchange of information has kept us all better informed.

Award to recognize outstanding continuing medical education sponsor

Med Chi's CMERC plans to give an award to the accredited continuing medical education sponsor(s) who, during the reaccreditation survey from June 1997 to March 1998, achieved a survey report without any deficiency or concern, or scored substantial compliance in all seven essentials, as well as commercial support standards. The award will consist of a plaque, which will give the sponsor recognition in attaining such an outstanding status. The award will be announced at the CMERC meeting during the Med Chi Annual Meeting. It is hoped that this recognition of CME sponsors will continue every year.

The award was made possible by a monetary award which the CMERC won from the national organization (ACCME) in 1997. We believe that recognizing our accredited CME sponsors through an award is a very good gesture, and a positive reinforcement.

The CMERC continues to enlist speakers for the annual workshop from accredited sponsors

Our experience during the last few years in enlisting speakers from our accredited sponsors has been very gratifying. The speakers like to share their practical experiences with their colleagues and the attendees appreciate good new ideas. This year, we have invited the three chairs of CME committees from hospitals of various sizes and diverse programs. John Mulvey, M.D., chair, CME Committee, Union Hospital in Elkton, Maryland, will speak on "Getting Started on the Right Foot: Tips from a New Sponsor." Murray Grant, M.D., director of CME at Holy Cross Hospital in Silver Spring, Maryland, and Bernetta Payne, librarian, will speak on "Managing a Large Department-Based Program." Francesco Dileo, M.D., chair, CME Committee, Springfield Hospital Center in Sykesville, Maryland, will speak on "Managing and Documenting: A New Chair's Perspective."

Deusdedit L. Jolbitado, M.D., chair, CMERC, will welcome all attendees, give a brief summary of the committee's activities this past year, including the updates in the handbook. He will also present the award to the outstanding CME sponsor, represented by John Mulvey, M.D., of Union Hospital.

Two CME sponsors received accreditation in March 1998

The University of Santo Tomas Medical Alumni Association of Maryland (USTMAAM), a charitable organization, was accredited for two years on its initial application, after a completed survey. All initial accreditation is provisional. The president is Ludovico Bengson, M.D., and the CME chair is Rhodora Tumanon, M.D. (This is a new applicant).

North Arundel Hospital in Glen Burnie was reaccredited for two years, after a completed survey. The CME chair is Clifford Andrew, M.D.

The handbook updating has been completed

The portions of the handbook that were updated included most of the forms, such as the activity planning form; sample letter of agreement between sponsor and commercial supporter; disclosure of relationship/affiliation between faculty/speaker and commercial company; the interim report format; consultation services; the mission statement; the application for accreditation; the appeals procedure; and conflict interest policy were revised and updated with a lawyer present to assure that there is legal

sufficiency. The policy on mergers, acquisitions, and other restructuring were also revised and updated.

The CMERC voted to stay with the previous Essential # 7, instead of the revised essential on joint sponsorship

Most of our accredited CME sponsors are more knowledgeable and comfortable with the unrevised joint sponsorship. This is also true with our surveyors. It was felt that continuing on would cause less disruption and confusion than changing the new one. Also, the unrevised essential requires integral participation by both the accredited and non-accredited sponsors in working on jointly sponsored continuing medical education activities. This is more stringent than the new essential. As a state medical society and intrastate accrediting body for CME programs, we have the right to choose this option, as we were informed at the ACCME meeting in Chicago last July.

Summary of the activities of the CMERC from May 1997 to March 1998

- Applications for accreditation/reaccreditation reviews (2 New) 16
- Interim report reviews 27
- Consultations with CME sponsors 13
- Surveys of CME sponsors completed 11
- Sponsors placed on probation 1

- Number of sponsors accredited (total) 11
- Number of years of accreditation
  - Four years 5
  - Three Years 1
  - Two Years ..... 5 (two provisional)
  - One Year 0

Reminder to all CME accredited sponsors

The CMERC has recently found that it is not kept informed when there are changes in the CME program administration, such as when a new CME chair is appointed, when there is a temporary suspension or cessation of CME activities for up to six months, or when the whole CME committee is replaced or discontinued.

It is very important that the CMERC be notified of these events so that it can assist in keeping the CME activities meeting requirements and not jeopardize accreditation status of the sponsor.

Deusdedit L. Jolbitado, M.D.
Dr. Jolbitado is chair of the CMERC of the Medical and Chirurgical Faculty of Maryland. ■

The purpose of this newsletter is to inform CME chairpersons, CME committee members, and all interested physicians about the activities of Med Chi's Continuing Medical Education Review Committee (CMERC) and about the rules and procedures that affect the implementation of CME programs in Maryland. When appropriate, news from the ACCME (Accreditation Council for Continuing Medical Education) is included.

Parris N. Glendening - Governor of Maryland

Martin P. Wasserman, M.D., J.D., Secretary
Department of Health & Mental Hygiene

Carlessia A. Hussein, Dr. P.H., Director
Community and Public Health Administration

Diane M. Dwyer, M.D., Director
Epidemiology & Disease Control Program

DHMH Maryland Department of Health & Mental Hygiene

EPIDEMIOLOGY AND DISEASE CONTROL PROGRAM

201 West Preston Street, Baltimore, Maryland 21201 (410) 767-6700

May/June, 1998

Selected Communicable Diseases in Maryland in 1997

This report, the first of a two-part series to be continued in August, contains tables that detail the case numbers and rates for selected communicable diseases reported to the Epidemiology and Disease Control Program in 1997. In the August issue, brief narrative accounts augmented with graphs and maps will describe the epidemiology of a subset of those diseases.

This report summarizes cases *reported in* 1997 in Maryland. Due to delayed reporting, some of the cases will have had onset of disease in an earlier year. (Through 1993, this yearly report summarized cases with *onset in* the reporting year.) Tables 1a and 1b detail the number of cases reported by jurisdiction; tables 2a and 2b contain the corresponding case rates per 100,000 population. The population figures used in rate calculations come from the Maryland Office of Planning and the U.S. Census Bureau (July 1, 1997 Population Estimate).

Communicable disease reporting is mandated by both Maryland law and regulation. This passive system receives reports primarily from health care providers and laboratories; some reports come from other sources. Active surveillance is conducted for invasive bacterial disease due *Haemophilus influenzae*, *Neisseria meningitidis*, and other selected pathogens. The new Emerging Infections Program is another active surveillance project that targets primarily foodborne disease. The communicable disease staff at the State's 24 local health departments verify that cases meet a standard clinical and/or laboratory case definition of the Centers for Disease Control and Prevention (CDC). Local investigators may also seek to identify risk factors for disease acquisition, provide patient education to reduce the spread of disease, identify contacts for prophylactic treatment, and initiate other public health control measures when appropriate.

Each week data from the 24 local health departments is combined at the Division of Communicable Disease Surveillance at DHMH and then transmitted to the CDC for the Morbidity and Mortality Weekly Report (*MMWR*). These provisional weekly data are then further reviewed, edited, and analyzed at the local and state health departments to produce this yearly summary.

The prompt, accurate, and complete reporting by physicians, other health care providers, laboratories, etc., is extremely important to achieving our goal to describe and control communicable diseases in Maryland. We are committed to improving the quality of surveillance data and to increasing accessibility to it via our internet home page (www.charm.net/~epi1). We gratefully acknowledge the contributions of local health departments, infection control professionals, laboratories, physicians and other health care providers who provided essential information. Thanks are also due to the DHMH staff who assisted in case investigation and data analysis, and especially to Ms. Anne Jones, who coordinated data entry and editing.

Table 1a. Cases of Selected Notifiable Diseases Reported in Maryland in 1997 by County

DHMH
Maryland Department of Health and Mental Hygiene

Jurisdiction	Population	Infectious Parotitis (Mumps)	Pertussis	Rubella (German Measles)	Rubeola (Measles)	Hepatitis A	Hepatitis B	Hepatitis NANB	Encephalitis	Haemophilus influenzae Disease	Meningococcal Disease	Meningitis, Bacterial	Meningitis, Aseptic	Salmonellosis	Typhoid Fever	Shigellosis	AIDS	Chlamydia	Gonorrhea	Syphilis, Primary and Secondary	Syphilis, Congenital	Tuberculosis	Lyme Disease	Rocky Mountain Spotted Fever	Animal Bites	Rabies, Animal
Allegany	74,892		2							1	1		2	5			3	75	24	2		1	2		265	7
Anne Arundel	467,426		8			16	16		1	6	4	13	46	66		52	48	775	365	15		18	50	3	1,480	97
Baltimore City	670,572		17		1	35	14			25	14	36	25	124		132	1,007	6,066	6,693	667	55	92	5	1	1,070	4
Baltimore Co.	718,844		22			18	51	1	1	14	11	15	41	236	2	56	99	1,175	656	65	2	35	13	1	1,753	53
Calvert	68,030		2			5		1		1		2	16	14		1	10	113	49			1	28		225	17
Caroline	29,526												4	6			2	82	44			4	18	1	120	12
Carroll	142,906	1	2				5			1		2	1	25		2	3	54	12	2		1	18	1	334	24
Cecil	80,124					1	1			2				9			6	40	6			2	12		273	2
Charles	115,602		1			15	6						4	108		3	12	212	94	2		3	25	1	402	11
Dorchester	30,090						3						3	14		1	4	129	140	2			3	1	181	19
Frederick	185,815		9			3	4	2	1	3	2	1	5	39		5	10	164	102	3		6	6		343	72
Garrett	29,881		2			1				1	1	2		4			1	24	1			1	1		90	14
Harford	215,418		8			4	5	1	1		2	8	17	25		5	19	243	144	3		2	61	1	588	18
Howard	231,025		11			5	7					5	11	48		13	12	177	74	12	1	10	51	3	417	16
Kent	18,952					1										3	3	38	13				24		83	6
Montgomery	822,276		16			45	15		4	6	1	13	70	238	1	54	116	690	371	7		76	42	2	800	61
Prince George's	783,688		11			33	35	1	2	4	6	14	62	144	2	66	289	2,754	2,073	86	1	60	67		1,133	38
Queen Anne's	38,970						1							11		3	3	52	30		1	9	32		183	20
Saint Mary's	84,438					2							1	32		2	4	166	76			4	2		255	8
Somerset	24,525						1					2	2	12			1	106	38	4		2	2		101	20
Talbot	32,714		4						1	1			2	6			7	110	65	1		2	13	5	132	10
Washington	128,459		1			1	3		1			3	21	24		2	5	166	115			1	2		314	22
Wicomico	80,598		3		1	2	4	1	1			4	9	31		13	10	389	317	13		6	1		524	39
Worcester	41,111						1	2		1		1		10		10	8	170	61	5		4	15		194	23
Not Stated																	120									
Maryland Total	5,115,882	1	119	0	2	187	172	9	13	66	42	121	342	1,231	5	423	1,802	13,970	11,563	889	60	340	493	20	11,260	613
Maryland Totals	1996	37	278	0	2	256	169	8	30	76	58	113	210	1,160	18	985	2,278	20,705	11,316	733	45	319	448	38	10,415	637
for	1995	41	49	1	1	221	262	6	35	74	42	172	323	1,215	6	639	2,500		14,675	567	24	370	368	36	10,491	441
Prior Years	1994	65	53	0	4	198	351	23	33	80	28	175	244	1,167	14	323	2,808		16,823	326	22	363	343	20	10,396	520
	1993	85	167	2	4	184	288	16	25	64	50	158	257	1,028	8	453	1,617		13,832	393	36	417	207	23	10,349	624
	1992	84	52	5	17	254	388	31	22	81	31	165	223	1,021	7	430	1,273		16,513	590	62	442	185	16	10,676	553

Table 1b. Cases of Selected Notifiable Diseases Reported in Maryland in 1997 by County

Continued

DHMH Maryland Department of Health and Mental Hygiene

Jurisdiction	Population	Amebiasis	Anthrax	Botulism	Brucellosis	Campylobacteriosis *	Cholera	E. coli O157:H7	Giardiasis *	Kawasaki Syndrome	Legionellosis	Leprosy	Leptospirosis	Listeriosis *	Malaria	Mycobacteriosis, Non-TB	Newborn Septicemia	Plague	Poliomyelitis	Psittacosis	S. typhi Carrier	Tetanus	Trichinosis	Tularemia	Vibrio (Non-O1) Infection	Yersiniosis
Allegany	74,892					2					1					6										
Anne Arundel	467,426	2				33		2	29	2				2		46	7								1	
Baltimore City	670,572	3				63		1	27		3		3	4	2	416									3	3
Baltimore Co.	718,844	2				22		7	2	1	4			6	5	46	5								1	1
Calvert	68,030							1	1	1	1			1		3										
Caroline	29,526					1									1											
Carroll	142,906					18		1	7						1	19				1					1	
Cecil	80,124															8										
Charles	115,602					5			1	1					2	1	1									
Dorchester	30,090															2	1									
Frederick	185,815					17		4	5	1				1	1	16						1				
Garrett	29,881															1										
Harford	215,418	1				10		1	7		6				1	17										1
Howard	231,025	3				2		1	12							7	1									
Kent	18,952															2										1
Montgomery	822,276	8				40		3	22	5	1		1	6	42	97	3									
Prince George's	783,688	3				30		3	8	14	4	1		2	30	114	26				2					2
Queen Anne's	38,970					1										2										
Saint Mary's	84,438					4				1						4										
Somerset	24,525					4			2					1		11	2				1					
Talbot	32,714					2										5										1
Washington	128,459					2		1	2	1	3					20										
Wicomico	80,598					21		3	9	1						18	6									
Worcester	41,111					3			6	1						14	1									
Not Stated																										
Maryland Total	5,115,882	22	0	0	0	280	0	28	140	29	23	1	4	23	85	875	53	0	0	1	3	1	0	0	6	9
Maryland Totals	1996	16	0	1	0	282	0		148	29	39	0	1	13	87	802	54	0	0	0	0	0	0	0	4	8
for	1995	11	0	1	2	206	0		147	39	29	2	1	10	63	1040	93	0	0	2	0	0	0	0	6	13
Prior Years	1994	12	0	1	1	204	1		108	36	82	0	1	19	83	1048	77	0	1	2	2	1	0	1	1	18
	1993	9	0	1	0	141	0		107	30	52	0	1	9	57	695	133	0	0	1	1	2	0	0	1	24
	1992	10	0	1	0	150	3		69	26	39	0	0	25	61	577	136	0	0	2	4	0	3	0	5	23

Epidemiology and Disease Control Program - Division of Communicable Disease Surveillance

Rev. 4/7/98

* Not a reportable disease - cases not entered by all jurisdictions

Table 2a. Case Rates per 100,000 Population of Selected Notifiable Diseases Reported in Maryland, 1997

DHMH
Maryland Department of Health and Mental Hygiene

Jurisdiction	Population	Infectious Parotitis (Mumps)	Pertussis	Rubella (German Measles)	Rubeola (Measles)	Hepatitis A	Hepatitis B	Hepatitis NANB	Encephalitis	Haemophilus influenzae Disease	Meningococcal Disease	Meningitis, Bacterial	Meningitis, Aseptic	Salmonellosis	Typhoid Fever	Shigellosis	AIDS	Chlamydia	Gonorrhea	Syphilis, Primary and Secondary	Syphilis, Congenital	Tuberculosis	Lyme Disease	Rocky Mountain Spotted Fever	Animal Bites	Rabies, Animal
Allegany	74,892	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.3	0.0	2.7	6.7	0.0	0.0	4.0	100	32	2.7	0.0	1.3	2.7	0.0	354	9.3
Anne Arundel	467,426	0.0	1.7	0.0	0.0	3.4	3.4	0.0	0.2	1.3	0.9	2.8	9.8	14.1	0.0	11.1	10.3	166	78	3.2	0.0	3.9	10.7	0.6	317	20.8
Baltimore City	670,572	0.0	2.5	0.0	0.1	5.2	2.1	0.0	0.0	3.7	2.1	5.4	3.7	18.5	0.0	19.7	150.2	905	998	99.5	8.2	13.7	0.7	0.1	160	0.6
Baltimore Co.	718,844	0.0	3.1	0.0	0.0	2.5	7.1	0.1	0.1	1.9	1.5	2.1	5.7	32.8	0.3	7.8	13.8	163	91	9.0	0.3	4.9	1.8	0.1	244	7.4
Calvert	68,030	0.0	2.9	0.0	0.0	7.3	0.0	1.5	0.0	1.5	0.0	2.9	23.5	20.6	0.0	1.5	14.7	166	72	0.0	0.0	1.5	41.2	0.0	331	25.0
Caroline	29,526	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.5	20.3	0.0	0.0	6.8	278	149	0.0	0.0	13.5	61.0	3.4	406	40.6
Carroll	142,906	0.7	1.4	0.0	0.0	0.0	3.5	0.0	0.0	0.7	0.0	1.4	0.7	17.5	0.0	1.4	2.1	38	8	1.4	0.0	0.7	12.6	0.7	234	16.8
Cecil	80,124	0.0	0.0	0.0	0.0	1.2	1.2	0.0	0.0	2.5	0.0	0.0	0.0	11.2	0.0	0.0	7.5	50	7	0.0	0.0	2.5	15.0	0.0	341	2.5
Charles	115,602	0.0	0.9	0.0	0.0	13.0	5.2	0.0	0.0	0.0	0.0	0.0	3.5	93.4	0.0	2.6	10.4	183	81	1.7	0.0	2.6	21.6	0.9	348	9.5
Dorchester	30,090	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	10.0	46.5	0.0	3.3	13.3	429	465	6.6	0.0	0.0	10.0	3.3	602	63.1
Frederick	185,815	0.0	4.8	0.0	0.0	1.6	2.2	1.1	0.5	1.6	1.1	0.5	2.7	21.0	0.0	2.7	5.4	88	55	1.6	0.0	3.2	3.2	0.0	185	38.7
Garrett	29,881	0.0	6.7	0.0	0.0	3.3	0.0	0.0	0.0	3.3	3.3	6.7	0.0	13.4	0.0	0.0	3.3	80	3	0.0	0.0	3.3	3.3	0.0	301	46.9
Harford	215,418	0.0	3.7	0.0	0.0	1.9	2.3	0.5	0.5	0.0	0.9	3.7	7.9	11.6	0.0	2.3	8.8	113	67	1.4	0.0	0.9	28.3	0.5	273	8.4
Howard	231,025	0.0	4.8	0.0	0.0	2.2	3.0	0.0	0.0	0.0	0.0	2.2	4.8	20.8	0.0	5.6	5.2	77	32	5.2	0.4	4.3	22.1	1.3	180	6.9
Kent	18,952	0.0	0.0	0.0	0.0	5.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.8	15.8	201	69	0.0	0.0	0.0	126.6	0.0	438	31.7
Montgomery	822,276	0.0	1.9	0.0	0.0	5.5	1.8	0.0	0.5	0.7	0.1	1.6	8.5	28.9	0.1	6.6	14.1	84	45	0.9	0.0	9.2	5.1	0.2	97	7.4
Prince George's	783,688	0.0	1.4	0.0	0.0	4.2	4.5	0.1	0.3	0.5	0.8	1.8	7.9	18.4	0.3	8.4	36.9	351	265	11.0	0.1	7.7	8.5	0.0	145	4.8
Queen Anne's	38,970	0.0	0.0	0.0	0.0	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	28.2	0.0	7.7	7.7	133	77	0.0	2.6	23.1	82.1	0.0	470	51.3
Saint Mary's	84,438	0.0	0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.0	0.0	0.0	1.2	37.9	0.0	2.4	4.7	197	90	0.0	0.0	4.7	2.4	0.0	302	9.5
Somerset	24,525	0.0	0.0	0.0	0.0	0.0	4.1	0.0	0.0	0.0	0.0	8.2	8.2	48.9	0.0	0.0	4.1	432	155	16.3	0.0	8.2	8.2	0.0	412	81.5
Talbot	32,714	0.0	12.2	0.0	0.0	0.0	0.0	0.0	3.1	3.1	0.0	0.0	6.1	18.3	0.0	0.0	21.4	336	199	3.1	0.0	6.1	39.7	15.3	403	30.6
Washington	128,459	0.0	0.8	0.0	0.0	0.8	2.3	0.0	0.8	0.0	0.0	2.3	16.3	18.7	0.0	1.6	3.9	129	90	0.0	0.0	0.8	1.6	0.0	244	17.1
Wicomico	80,598	0.0	3.7	0.0	1.2	2.5	5.0	1.2	1.2	0.0	0.0	5.0	11.2	38.5	0.0	16.1	12.4	483	393	16.1	0.0	7.4	1.2	0.0	650	48.4
Worcester	41,111	0.0	0.0	0.0	0.0	0.0	2.4	4.9	0.0	2.4	0.0	0.0	0.0	24.3	0.0	24.3	19.5	414	148	12.2	0.0	9.7	36.5	0.0	472	55.9
Maryland Total	5,115,882	0.0	2.3	0.0	0.0	3.7	3.4	0.2	0.3	1.3	0.8	2.4	6.7	24.1	0.1	8.3	35.2	273	226	17.4	1.2	6.6	9.6	0.4	220	12.0
Maryland Totals for Prior Years	1996	0.7	5.5	0.0	0.0	5.0	3.3	0.2	0.6	1.5	1.1	2.2	4.1	22.9	0.4	19.4	44.9	408	223	14.4	0.9	6.3	8.8	0.7	205	12.6
	1995	0.8	1.0	0.0	0.0	4.4	5.2	0.1	0.7	1.5	0.8	3.4	6.4	24.1	0.1	12.7	49.6		291	11.3	0.5	7.3	7.3	0.7	208	8.8
	1994	1.3	1.1	0.0	0.1	4.0	7.0	0.5	0.7	1.6	0.6	3.5	4.9	23.3	0.3	6.5	56.2		336	6.5	0.4	7.3	6.9	0.4	208	10.4
	1993	1.7	3.4	0.0	0.1	3.7	5.8	0.3	0.5	1.3	1.0	3.2	5.2	20.8	0.2	9.1	32.6		279	7.9	0.7	8.4	4.2	0.5	209	12.6
	1992	1.7	1.1	0.1	0.3	5.2	7.9	0.6	0.4	1.6	0.6	3.4	4.5	20.8	0.1	8.8	25.9		336	12.0	1.3	9.0	3.8	0.3	217	11.3

Table 2b. Cases Rates per 100,000 Population of Selected Notifiable Diseases Reported in Maryland, 1997

Continued

DHMH
Maryland Department of Health and Mental Hygiene

Jurisdiction	Population	Amebiasis	Anthrax	Botulism	Brucellosis	Campylobacteriosis *	Cholera	E. coli O157:H7	Giardiasis *	Kawasaki Syndrome	Legionellosis	Leprosy	Leptospirosis	Listeriosis *	Malaria	Mycobacteriosis, Non-TB	Newborn Septicemia	Plague	Poliomyelitis	Psittacosis	S. typhi Carrier	Tetanus	Trichinosis	Tularemia	Vibrio (Non-O1) Infection	Yersiniosis
Allegany	74,892	0.0	0.0	0.0	0.0	2.7	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anne Arundel	467,426	0.4	0.0	0.0	0.0	7.1	0.0	0.4	6.2	0.4	0.0	0.0	0.0	0.4	0.0	9.8	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Baltimore City	670,572	0.4	0.0	0.0	0.0	9.4	0.0	0.1	4.0	0.0	0.4	0.0	0.4	0.6	0.3	62.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4
Baltimore Co.	718,844	0.3	0.0	0.0	0.0	3.1	0.0	1.0	0.3	0.1	0.6	0.0	0.0	0.8	0.7	6.4	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Calvert	68,030	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.5	1.5	1.5	0.0	0.0	1.5	0.0	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Caroline	29,526	0.0	0.0	0.0	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Carroll	142,906	0.0	0.0	0.0	0.0	12.6	0.0	0.7	4.9	0.0	0.0	0.0	0.0	0.0	0.7	13.3	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.7	0.0
Cecil	80,124	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Charles	115,602	0.0	0.0	0.0	0.0	4.3	0.0	0.0	0.9	0.9	0.0	0.0	0.0	0.0	1.7	0.9	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dorchester	30,090	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.6	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Frederick	185,815	0.0	0.0	0.0	0.0	9.1	0.0	2.2	2.7	0.5	0.0	0.0	0.0	0.5	0.5	8.6	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0
Garrett	29,881	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Harford	215,418	0.5	0.0	0.0	0.0	4.6	0.0	0.5	3.2	0.0	2.8	0.0	0.0	0.0	0.5	7.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Howard	231,025	1.3	0.0	0.0	0.0	0.9	0.0	0.4	5.2	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kent	18,952	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3
Montgomery	822,276	1.0	0.0	0.0	0.0	4.9	0.0	0.4	2.7	0.6	0.1	0.0	0.1	0.7	5.1	11.8	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Prince George's	783,688	0.4	0.0	0.0	0.0	3.8	0.0	0.4	1.0	1.8	0.5	0.1	0.0	0.3	3.8	14.5	3.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.3
Queen Anne's	38,970	0.0	0.0	0.0	0.0	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Saint Mary's	84,438	0.0	0.0	0.0	0.0	4.7	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Somerset	24,525	0.0	0.0	0.0	0.0	16.3	0.0	0.0	8.2	0.0	0.0	0.0	0.0	4.1	0.0	44.9	8.2	0.0	0.0	0.0	4.1	0.0	0.0	0.0	0.0	0.0
Talbot	32,714	0.0	0.0	0.0	0.0	6.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.1
Washington	128,459	0.0	0.0	0.0	0.0	1.6	0.0	0.8	1.6	0.8	2.3	0.0	0.0	0.0	0.0	15.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wicomico	80,598	0.0	0.0	0.0	0.0	26.1	0.0	3.7	11.2	1.2	0.0	0.0	0.0	0.0	0.0	22.3	7.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Worcester	41,111	0.0	0.0	0.0	0.0	7.3	0.0	0.0	14.6	2.4	0.0	0.0	0.0	0.0	0.0	34.1	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maryland Total	5,115,882	0.4	0.0	0.0	0.0	5.5	0.0	0.5	2.7	0.6	0.4	0.0	0.1	0.4	1.7	17.1	1.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.2
Maryland Totals for Prior Years	1996	0.3	0.0	0.0	0.0	5.6	0.0		2.9	0.6	0.8	0.0	0.0	0.3	1.7	15.8	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2
	1995	0.2	0.0	0.0	0.0	4.1	0.0		2.9	0.8	0.6	0.0	0.0	0.2	1.3	20.6	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3
	1994	0.2	0.0	0.0	0.0	4.1	0.0		2.2	0.7	1.6	0.0	0.0	0.4	1.7	21.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
	1993	0.2	0.0	0.0	0.0	2.8	0.0		2.2	0.6	1.0	0.0	0.0	0.2	1.2	14.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
	1992	0.2	0.0	0.0	0.0	3.1	0.1		1.4	0.5	0.8	0.0	0.0	0.5	1.2	11.8	2.8	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.5

Epidemiology and Disease Control Program - Division of Communicable Disease Surveillance

Rev. 4/7/98

* Not a reportable disease - cases not entered by all jurisdictions

Thank you to the many Med Chi doctors who have already volunteered for The Mentor Program

The Maryland State Medical Student Association thanks you for your help.

The Mentor Program will enable MSMSA members (medical student member of Med Chi) to contact you and ask questions about your specialty, your practice, HMO's, or other general advice about the medical profession. You tell us when you are available, so you will not be contacted when you are busy. We believe with your help this program will be popular with medical students and will fill a vital information gap in medical education. Especially good connections may blossom into rewarding mentoring relationships.

Please fill out the following application and FAX it to Med Chi at (410)727-5967, or MAIL it to Russel Kujan, Med Chi, 1211 Cathedral Street, Baltimore, MD 21201. Questions? Contact Russel Kujan (410) 539-0872, extension 344 or (800) 492-1056, extension 344. Thank you.

Please print or type your name clearly.

Name: _____

Address (include zip code): _____

_____

Telephone #1: _____ Telephone #2 _____

Fax Number: _____

Specialty #1 _____ Specialty #2 _____

Circle the days/times you would prefer to be contacted:

	AM						PM									
Monday	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9
Tuesday	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9
Wednesday	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9
Thursday	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9
Friday	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9

Are you available on Saturdays? If yes, indicate hours: _____

List any preferences or considerations for student who contact you: _____

_____

Optional: Undergraduate College/University: _____

Medical School Attended: _____

List your activities at Med Chi: _____

The Johns Hopkins Medical Institutions

All courses at the Thomas B. Turner Building unless otherwise indicated. For information on continuing medical education activities, contact the Office of Continuing Medical Education, 720 Rutland Ave., Baltimore, MD 21205, 410-955-2959, Fax 410-955-0807 (e-mail: cmenet@som.adm.jhu.edu).

Women's issues in HIV, sponsored by The Johns Hopkins Medical Institutions, department of gynecology and obstetrics. Credits: 16 Cat 1 AMA credits. Fee: $295/physicians; $225/nurses, allied health professionals; $145/residents,fellows. — **May 11–12**

Pediatric allergy and immunology for the practitioner, sponsored by division of pediatric allergy and immunology, Johns Hopkins Medical Institutions. Credits: Up to 14 Cat 1 AMA credits. $275/physicians; $200/residents, fellows, allied health professionals. (After 4/1/98, $295 and $220, respectively.) — **May 14–15**

Frontiers in research and clinical management of asthma and allergy, sponsored by Johns Hopkins University School of Medicine, division of allergy and immunology, division of pulmonary critical care medicine, and Asthma and Allergy Foundation of America Maryland Chapter, at Annapolis Marriott Waterfront Hotel, Annapolis, Maryland. Fee: $395/physicians; $275/residents, fellows, allied health professionals. — **May 29–31**

Eleventh summer institute in environmental health sciences, Johns Hopkins University, School of Public Health, and department of environmental health sciences, at Johns Hopkins School of Hygiene. Info: Kay Castleberry, 410-955-2212, email: summerEHS@jhsph.edu. — **June 1–12**

The pathogenesis and treatment of age-related macular degeneration, sponsored by Wilmer Ophthalmological Institute at Johns Hopkins. Fee: $400/physicians; $250 basic scientists, residents, fellows. — **June 4–6**

Clinical trials: design, analysis, and dissemination of results, sponsored by Center for Clinical Trials, Johns Hopkins Medical Institutions. Credits: Up to 17 Cat 1 AMA credits. Fee: $850/physicians and health professionals; $600 residents/fellows. — **June 11–12**

Perioperative management, sponsored by Johns Hopkins University School of Medicine, at Luxury Collection Aspen Hotel, Aspen, Colorado. Credits: Up to 21 Cat 1 AMA credits. Fee: $525/physicians; $490/residents, fellows, CRNAs, and allied health professionals. (After 7/16/98, $550 and $515, respectively.) — **Aug. 17–20**

Fourth annual Johns Hopkins hepato-biliary update, sponsored by the departments of medicine and surgery, Johns Hopkins University School of Medicine, at Dunes Manor Hotel, Ocean City, Maryland. Fee: $350/physicians; $175/residents, fellows, allied health professionals. — **Sept. 11–13**

Sixth annual progress in hematologic malignancies and bone marrow transplantation, sponsored by the division of hematologic malignancies and department of oncology, Johns Hopkins Medical Institutions. Credits: Up to 7.5 Cat 1 AMA credits. Fee: $100/alumni past registrants; $125/new registrations. — **Sept. 18**

24th annual topics in gastroenterology and liver disease, sponsored by the Johns Hopkins Medical Institutions Myerhoff Center for Digestive Disease. Credits: Up to 24 Cat 1 AMA credits. Fee: $495/physicians; $250/residents, fellows. (After 8/14/98, $535 and $285, respectively.) — **Oct. 7–9**

University of Maryland

For each course, additional information may be obtained by contacting the Program of Continuing Education, University of Maryland School of Medicine, Room 12-011, BRB, 655 W. Baltimore St., Batlimore, MD 21201 (410-706-3959), or by calling the phone number listed after a specific program. Fax 410-706-3103.

Macular disease for the comprehensive ophthalmologist, sponsored by the University of Maryland School of Medicine in conjunction with the Maryland Center for Eye Care, at BWI Airport Hotel, Baltimore, Maryland. Info: Scott Steidl, M.D., 410-328-5934, Fax 410-328-6346. **Sept. 18**

Miscellaneous

International conference on physician health, sponsored by the American Medical Association and the Canadian Medical Association, Victoria, British Columbia, Canada. Info: E. Tejcek, 312-464-5073, fax: 312-464-5841, email: elaine_tejcek@ama-assn.org. **Apr. 29–May 2**

Cancer prevention in community practice, sponsored by the Medical and Chirurgical Faculty of Maryland, at Southern Maryland Hospital Center, Prince George's County, Maryland. Free CME credits available. Info: Carol Schwartz, 410-539-0872 or 1-800-492-1056. **May 5**

Clinical auscultation of the heart, sponsored by the American College of Cariology, at Georgetown University Medical Center, Washington, DC. CME Credits: 21.5 Cat 1 AMA credits. Info: 1-800-253-4636, fax: 301-897-9745. **May 13–15**

Ambulatory surgery '98: the next phase, sponsored by the Federated Ambulatory Surgery Association, at the Sheraton Harbor Island Hotel, San Diego, California. Info: 703-836-8808. **May. 14–16**

Internal derangements of joints: MR imaging, sponsored by the International Institute for Continuing Medical Education, at The Plaza Hotel, New York. CME Credits: 19.5 Cat 1 AMA credits. Fee: $595/physicians; $395/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **May 15–17**

Excellence in diabetes management, sponsored by the Office of Continuing Medical Education, Washington University School of Medicine, at The Ritz-Carlton Hotel, St. Louis, Missouri. Info: 314-362-6891 or 1-800-325-9862, fax: 314-362-1087, email: cme@msnotes.wustl.edu. **May 16**

26th annual Hans Berger clinical neuro-physiology symposium – a comprehensive update, sponsored by the Office of Continuing Medical Education, Virginia Commonwealth University, at the Medical College of Virginia Campus, Richmond, Virginia. CME Credits: 13.75 Cat 1 AMA credits. Fee: $375. Info: Nancie Mervis, 1-800-413-2872 or 804-828-8640, fax: 804-828-7438. **May 17–19**

Cancer prevention in community practice, sponsored by the Medical and Chirurgical Faculty of Maryland, at Greater Baltimore Medical Center, Towson, Maryland. Free CME credits available. Info: Carol Schwartz, 410-539-0872 or 1-800-492-1056. **May 21**

3rd annual mammography: practical challenges for the 90s, sponsored by X-Ray Imaging Associates of New Mexico, at the Inn at Loredo, Santa Fe, New Mexico. CME Credits: 20 Cat 1 AMA credits. Fee: $650/physicians; $450/residents, fellows, technologists, nurses. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **May 22–25**

22nd annual Williamsburg conference, cognitive, neuromedical & behavioral aspects of brain injury, sponsored by the Office of Continuing Medical Education, Virginia Commonwealth University, Medical College of Virginia Campus, at the Williamsburg Marriott Hotel, Williamsburg, Virginia. CME Credits: 23.5 Cat 1 AMA credits. Fee: $425. Info: Nancie Mervis, 1-800-413-2872 or 804-828-8640, fax: 804-828-7438. **June 4–7**

Cancer prevention in community practice, sponsored by the Medical and Chirurgical Faculty of Maryland, at Harford Memorial Hospital, Harford County. Free CME credits available. Info: Carol Schwartz, 410-539-0872 or 1-800-492-1056. **June 10**

Miscellaneous (continued)

American medicine in a critical perspective, sponsored by the Florida Medical Association and Continuing Education, Inc., aboard Holland America's new *ms Rotterdam VI,* crusing the Norwegian Fjords to the North Cape. CME Credits: 20 Cat 1 AMA credits. Fee: $299 CME fee; from $3252 for cabins. Info: 1-800-926-3775. — **June 23–July 5**

Cancer prevention in community practice, sponsored by the Medical and Chirurgical Faculty of Maryland, at Laurel Regional Hospital, Price George's County. Free CME credits available. Info: Carol Schwartz, 410-539-0872 or 1-800-492-1056. — **June 24**

12th annual frontiers in endourology, retrograde intrarenal surgery, ureteroscopy, stents and other minimally invasive techniques: nonincisional access to the entire urinary tract, sponsored by the Office of Continuing Medical Education, Washington University School of Medicine, St. Louis, Missouri. CME Credits: 22 Cat 1 AMA credits. Info: 314-362-6891 or 1-800-325-9862, fax: 314-362-1087, email: cme@msnotes.wustl.edu. — **June 26–28**

Annual postgraduate course in abdominal imaging, sponsored by the Society of Uroradiology, at the Hamilton Princess Resort Hotel, Bermuda. CME Credits: 28 Cat 1 AMA credits. Fee: $650/physicians; $450/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. — **June 28–July 3**

Duke's advanced musculoskeletal MR imaging course, sponsored by the International Institute for Continuing Medical Education, at Disney's Coronado Springs, Orlando, Florida. CME Credits: 25 Cat 1 AMA credits. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. — **June 29–July 3**

Thai Physicians of America Association, sponsored by the Office of Continuing Medical Education, Washington University School of Medicine, at Prince of Songkla University, Hatyai, Songkla, Thailand. CME Credits: 8 Cat 1 AMA credits. Info: 314-362-6891 or 1-800-325-9862, fax: 314-362-1087, email: cme@msnotes.wustl.edu. — **July 1–3**

Medicine in the face of a new millennium, sponsored by the Eastern Medical Society, Puerto Rico Medical Association, at the Westin Rio Mar Beach Resort and Country Club, Puerto Rico. CME Credits: 12 Cat 1 AMA credits. Fee: $375/Puerto Rico Medical Association members; $490/non-members. Info: 787-721-6969, fax: 787-722-1191. — **July 2–5**

Breast imaging: optimizing your practice and exceeding the standard of care, sponsored by the International Institute for Continuing Medical Education, at the Banff Springs Resort & Spa, Banff, Alberta, Canada. CME Credits: 25 Cat 1 AMA credits. Fee: $650/physicians; $450/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. — **July 5–9**

Clinical allergy for the practicing physician, sponsored by the Office of Continuing Medical Education, Washington University School of Medicine, St. Louis, Missouri. Info: 314-362-6891 or 1-800-325-9862, fax: 314-362-1087, email: cme@msnotes.wustl.edu. — **July 17–18**

20th annual pediatrics at the beach, joint meeting with the American Academy of Pediatrics, Virginia Chapter, sponsored by the Office of Continuing Medical Education, Virginia Commonwealth University, Medical College of Virginia Campus, at the Sheraton Ocean front Hotel. CME Credits: 13 Cat 1 AMA credits. Fee: $425. Info: Nancie Mervis, 1-800-413-2872 or 804-828-8640, fax: 804-828-7438. — **July 17–19**

Duke's advanced musculoskeletal and body imaging course, sponsored by the International Institute for Continuing Medical Education, at Hotel Intercontinental, Montreal, Quebec, Canada. CME Credits: 25 Cat 1 AMA credits. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. — **July 27–31**

Imaging in Santa Fe, sponsored by the International Institute for Continuing Medical Education, at the La Fonda Hotel, Santa Fe, New Mexico. CME Credits: 21 Cat 1 AMA credits. Fee: $675/physicians; $475/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. — **July 29–Aug. 2**

Miscellaneous (continued)

Breast imaging and interventions: a multidisciplinary approach, sponsored by the International Institute for Continuing Medical Education, at the Inn at Loredo, Santa Fe, New Mexico. CME Credits: Approx. 26 Cat 1 AMA credits. Fee: $695/physicians; $495/others. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Aug. 3–7**

Benign Essential Blepharospasm Research Foundation (BEBRF) 1998 annual conference, sponsored by the Office of Continuing Medical Education, Washington University School of Medicine, at Marriott West Hotel, St. Louis, Missouri. Info: 314-362-6891 or 1-800-325-9862, fax: 314-362-1087, email: cme@msnotes.wustl.edu. **Aug. 22** **Aug. 22**

The International Skeletal Society annual meeting and course, sponsored by the International Skeletal Society, at Jury's Hotel, Dublin, Ireland. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Sept. 5-12** **Sept. 5–12**

Organ imaging review, sponsored by the University of Toronto, at the Toronto Hilton, Toronto, Ontario, Canada. CME Credits; 28 Cat 1 AMA credits. Fee: $520/physicians; $370/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Sept. 13–19**

Mammography update, sponsored by the University of Toronto, at the Toronto Hilton, Toronto, Ontario, Canada. CME Credits: 28 Cat 1 AMA credits. Fee: $695/physicians; $495/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Sept. 18–20**

PHYSICIAN'S RECOGNITION AWARD

For the months of January and February 1998, the physicians listed below received the American Medical Association (AMA) Physician's Recognition Award. Established in 1968, the award's purpose is to encourage physician participation in continuing medical education and to recognize those physicians who have voluntarily completed programs of continuing medical education.

Hubert Joseph Alpert
Robert Jos Bauer
Richard Berkowitz
Kenneth Alan Blank
William S. Bremer
Mohamad Nick Chehreh
Manuel S. Cockburn
Kay Ann Dellinger
Hammond James Dugan
Michael David Freedman
Stephen Wayne George
David Brian Glasser
Ayman Rajai Hakki
Aryeh Lev Herrera
Sushma Niranjan Jani
Nelson N. Kalil
William Robert Linthicum
Johnson Ming Yu Liu
Philip London
Molly Ann Green March
Louis Winaker Miller
Russell Wyman Moy
Marc Alain Mugmon
Kim Tua Pang
Angela Ruth Peterman
Glendon Ennes Rayson
David William Roberts
Jeffrey S. Sagel
Paul Snow
Larry Albert Snyder
Henry Jerome Sobel
Melito Mindo Torres
John Walter Valenteen
William Addison Warren
Stephen William White
James Douglas Winthrop

Miscellaneous (continued)

7th annual wound care symposium, sponsored by the Office of Continuing Medical Education, Virginia Commonwealth University, Medical College of Virginia Campus, at the Williamsburg Marriott Hotel, Williamsburg, Virginia. Info: Nancie Mervis, 1-800-413-2872 or 804-828-8640, fax: 804-828-7438. **Sept. 18–20**

Southeastern consortium for dermatology, sponsored by the Office of Continuing Medical Education, Virginia Commonwealth University, Medical College of Virginia Campus, at the Omni Richmond Hotel and MCV Campus, Richmond, Virginia. Info: Nancie Mervis, 1-800-413-2872 or 804-828-8640, fax: 804-828-7438. **Sept. 18–20**

Comprehensive gynecology: a clinical update for the practicing physician, sponsored by the Center for Bio-Medical Communication, Inc., at the Crowne Plaza Manhattan, New York. CME Credits: 13.5 Cat 1 AMA credits. Fee: $495 ($575 after July 17). Info: 201-385-8080, ext. 26, fax: 201-385-8580, email: jrosenberg@cbcbiomed.com. **Sept. 25–27**

Contemporary cardiothoracic surgery, sponsored by the Office of Continuing Medical Education, Washington University School of Medicine, St. Louis, Missouri. Info: 314-362-6891 or 1-800-325-9862, fax: 314-362-1087, email: cme@msnotes.wustl.edu. **Oct. 1–3**

5th annual current topics in cardiothoracic anesthesia, sponsored by the Office of Continuing Medical Education, Washington University School of Medicine, St. Louis, Missouri. Info: 314-362-6891 or 1-800-325-9862, fax: 314-362-1087, email: cme@msnotes.wustl.edu. **Oct. 1–3**

MARCOM II, second annual mid-atlantic regional conference on occupational medicine, sponsored by the Office of Continuing Medical Education, Virginia Commonwealth University, Medical College of Virginia Campus, at the Williamsburg Hospitality House, Williamsburg, Virginia. Info: Nancie Mervis, 1-800-413-2872 or 804-828-8640, fax: 804-828-7438. **Nov. 13–15**

PHYSICIAN PLACEMENT SERVICE

The Medical and Chirurgical Faculty of Maryland maintains a Placement Service for the convenience of Maryland physicians, hospitals, and communities in search of candidates for positions available in our state. A detailed description of such opportunities should be forwarded to:

Physician Placement Service, 1211 Cathedral Street, Baltimore, MD 21201
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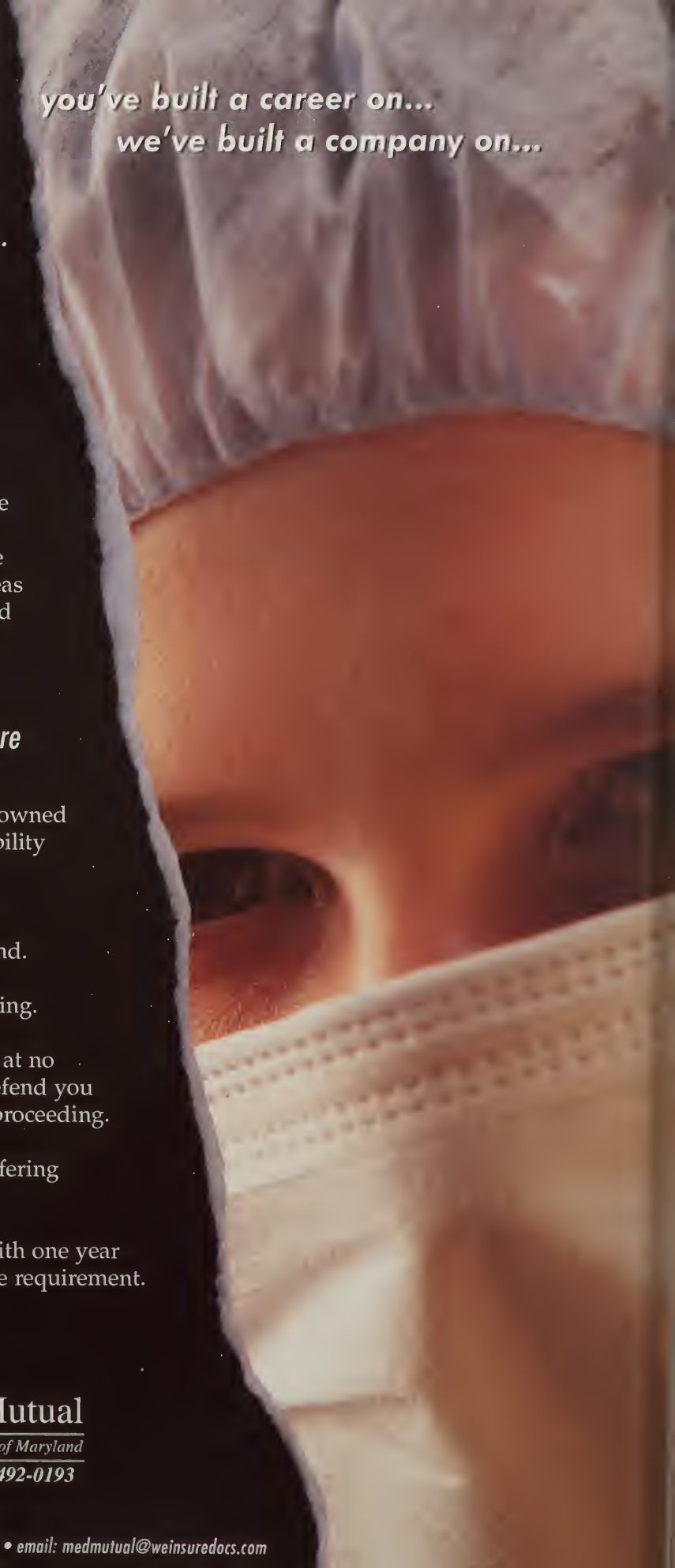

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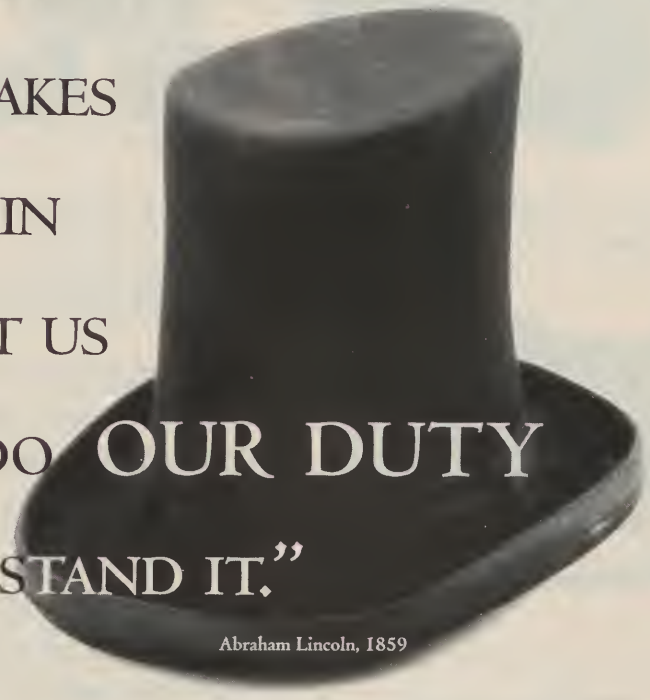

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From the Editor's Desk

On behalf of the editorial board of the *Maryland Medical Journal*, I am pleased to inform you that your journal will remain in printed format and will be published quarterly.

We had previously informed our readers of plans to stop producing a printed version of the journal and instead to provide the journal to members via the Med Chi website on the Internet. A MedChi *Maryland Medical Journal* Task Force was formed at the January House of Delegates meeting with the responsibility of studying the journal's feasibility and a reporting deadline of no later than September 1998. The Task Force moved swiftly and provided recommendations at the annual meeting held in May.

At that meeting, the recommendations of the Task Force, based on feedback from members and surveys of other state medical journals, were to 1.) continue production of the printed journal on a quarterly basis beginning in 1999, 2.) approve a one-time budget overrun to publish one additional journal in the fall of 1998, and 3.) give the editorial board discretion to publish additional issues if outside funding can be obtained. All three recommendations were approved by the House of Delegates.

The quarterly format of the journal will allow the editorial board more flexibility in accepting submissions and will allow more time to plan dedicated issues. It is our hope that we will be able to use the flexibility allowed by the House of Delegates to publish additional issues by securing private donations and outside funding.

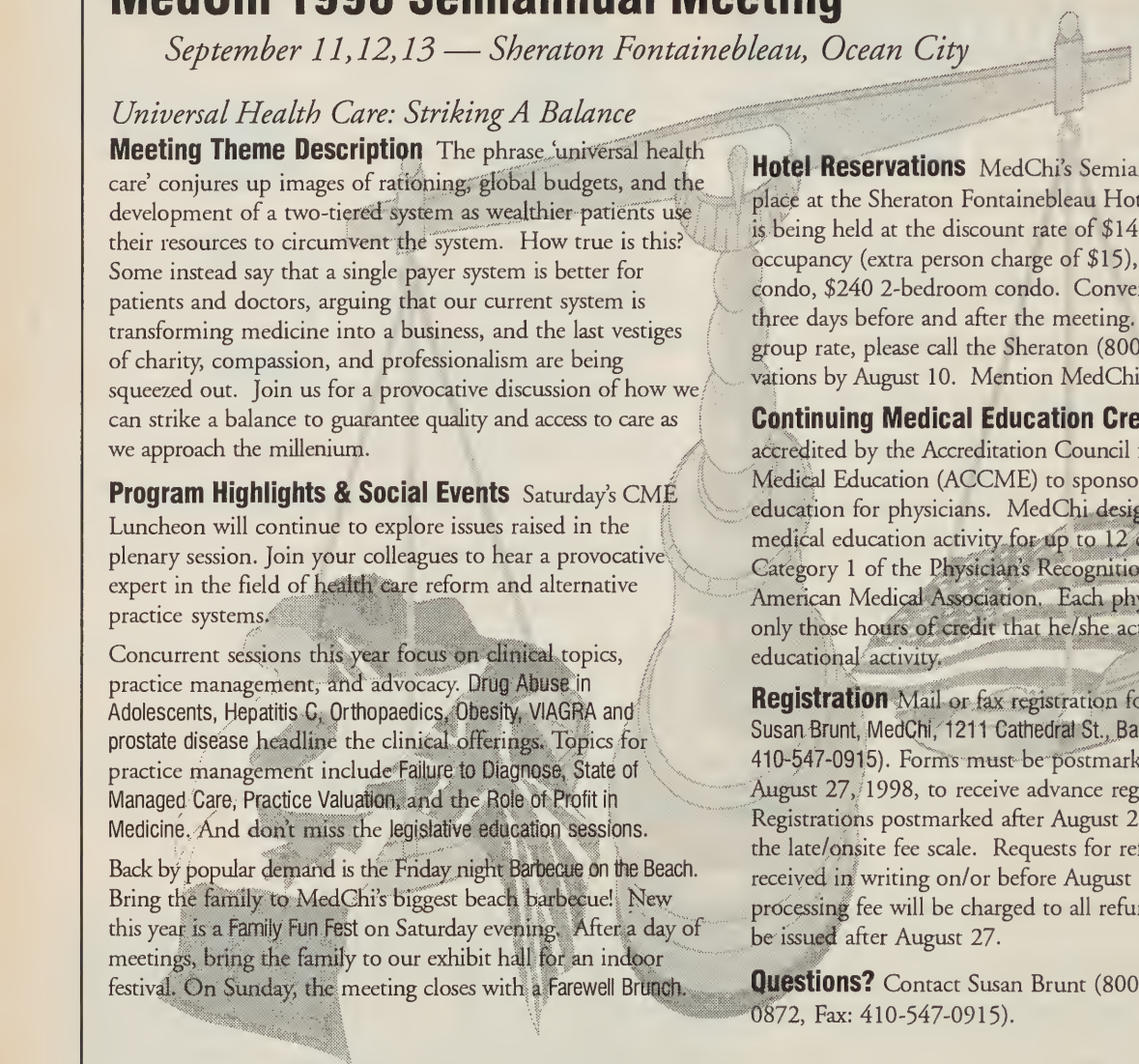
The continuation of the printed version of the journal is due to the strong level of member support – the editorial board thanks you.

Sincerely,

Marion Friedman
EDITOR

MedChi 1998 Semiannual Meeting

September 11,12,13 — Sheraton Fontainebleau, Ocean City



Universal Health Care: Striking A Balance

Meeting Theme Description The phrase 'universal health care' conjures up images of rationing, global budgets, and the development of a two-tiered system as wealthier patients use their resources to circumvent the system. How true is this? Some instead say that a single payer system is better for patients and doctors, arguing that our current system is transforming medicine into a business, and the last vestiges of charity, compassion, and professionalism are being squeezed out. Join us for a provocative discussion of how we can strike a balance to guarantee quality and access to care as we approach the millenium.

Program Highlights & Social Events Saturday's CME Luncheon will continue to explore issues raised in the plenary session. Join your colleagues to hear a provocative expert in the field of health care reform and alternative practice systems.

Concurrent sessions this year focus on clinical topics, practice management, and advocacy. Drug Abuse in Adolescents, Hepatitis C, Orthopaedics, Obesity, VIAGRA and prostate disease headline the clinical offerings. Topics for practice management include Failure to Diagnose, State of Managed Care, Practice Valuation, and the Role of Profit in Medicine. And don't miss the legislative education sessions.

Back by popular demand is the Friday night Barbecue on the Beach. Bring the family to MedChi's biggest beach barbecue! New this year is a Family Fun Fest on Saturday evening. After a day of meetings, bring the family to our exhibit hall for an indoor festival. On Sunday, the meeting closes with a Farewell Brunch.

Hotel Reservations MedChi's Semiannual Meeting takes place at the Sheraton Fontainebleau Hotel. A block of rooms is being held at the discount rate of $143 for single/double occupancy (extra person charge of $15), $175 1-bedroom condo, $240 2-bedroom condo. Convention rates apply for three days before and after the meeting. To guarantee the group rate, please call the Sheraton (800-638-2100) for reservations by August 10. Mention MedChi to receive these rates.

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Registration Mail or fax registration form with payment to: Susan Brunt, MedChi, 1211 Cathedral St., Baltimore, MD 21201 (Fax: 410-547-0915). Forms must be postmarked on/or before August 27, 1998, to receive advance registration rates. Registrations postmarked after August 27 will be subject to the late/onsite fee scale. Requests for refunds must be received in writing on/or before August 27, 1998. A $50 processing fee will be charged to all refunds. No refunds will be issued after August 27.

Questions? Contact Susan Brunt (800-492-1056/ 410-539-0872, Fax: 410-547-0915).

Registration Form—*SAVE NOW! Register early!*

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Events	No. Of Tickets	Amount
❑ Welcoming Breakfast (9/11)	$0 (1 per registrant)	n/a
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CASE RECORDS

of the University of Maryland School of Medicine and Baltimore VA Medical Center

Section editor: *R. Michael Benitez, M.D.*
Dr. Benitez is an assistant professor of medicine in the division of cardiology.

A 66-year-old woman with pneumonia and right heart failure

Nathan H. Carliner, M.D., discussant
Donna S. Hanes, M.D., chief medical resident
R. Michael Benitez, M.D., section editor

From the University of Maryland School of Medicine, where Dr. Carliner is a professor of medicine in the division of cardiology, Dr. Hanes is a clinical instructor of medicine in the department of medicine, and Dr. Benitez is an assistant professor of medicine in the division of cardiology.

Presentation of case

A 66-year-old woman presented with a cough productive of white sputum, rhinorrhea, a sore throat, myalgia, chills, and pleuritic chest pain of one week's duration. She was treated with amoxicillin, but stopped it after three days because of diarrhea. Her cough improved, but she became progressively dyspneic, especially with exertion. The patient developed orthopnea and required four pillows to sleep at night. She was admitted to the hospital.

The patient had a history of rheumatic fever as a child, and had developed atrial fibrillation at the age of 44. She suffered a stroke at the age of 54, which was thought to be related to her atrial fibrillation. She developed a seizure disorder at age 55. She reported three prior episodes of pneumonia, although details of these were unavailable. The patient did not smoke, drink alcohol, or use illicit drugs. Her medications included phenobarbital, digoxin, warfarin, phenytoin, and aspirin.

Her temperature was 102° F, blood pressure was 140/66 mm Hg, pulse was 125, and respirations were 24. The oropharynx was normal and no adenopathy was present. The internal jugular veins were markedly distended. Auscultation of the chest revealed rales at both lung bases and diffuse bronchovesicular breath sounds. The apex of the left ventricle was in the anterior axillary line, and a systolic lift was felt below the sternum. The cardiac rhythm was irregular, and the first heart sound was variable in intensity. A grade III/VI holosystolic murmur was present along the left sternal border radiating toward the apex. A faint, low-pitched diastolic murmur was heard at the apex. The second heart sound was normal, and an early diastolic sound was documented by some observers. No digital clubbing or cyanosis was noted. The remainder of the examination was normal.

Serum phenytoin and digoxin levels were within therapeutic range. The transaminases, alkaline phosphatase, and bilirubin were normal, as was the urinalysis. A sample of arterial blood while the patient was breathing room air yielded a pH of 7.52, a pCO_2 of 22, and a pO_2 of 55. Serum chemistries on admission were normal. The remainder of the laboratory values are shown in **Table 1**. An electrocardiogram showed atrial fibrillation with a rapid ventricular response, a QRS axis of +90, an RSR pattern

CASE RECORDS

in V1, and small terminal "S" waves in leads V5 and V6. The admission PA and lateral chest x-rays are shown in **Figure 1**.

Ceftriaxone, erythromycin, and diuretics were administered intravenously; warfarin was discontinued and supplemental oxygen was administered by face mask. By her fourth day in the hospital, the patient was afebrile, and the pulmonary findings on chest x-ray had cleared, but hypoxia persisted, requiring supplemental oxygen. A transthoracic echocardiogram was performed and showed marked dilatation of both atria. The mitral valve was poorly visualized, but appeared to be stenotic, and the estimated mitral valve area by Doppler pressure half-time was 0.9 cm^2 (normal, 4-6 cm^2). Severe tricuspid regurgitation was noted on Doppler examination and the pulmonary artery systolic pressure was estimated at 60 mm Hg (normal, 15-30 mm Hg). A transesophageal echocardiogram confirmed a thickened and stenotic mitral valve, which domed in diastole (**Figure 2**) and severe dilatation of the right heart chambers with severe tricuspid regurgitation. Based on mitral valvular mobility, calcification, thickening, and subvalvular calcification it was felt that the patient was a reasonable candidate for balloon mitral valvotomy. A further diagnostic procedure was performed.

TABLE 1. Admission laboratory values

White blood cells	11,300/mm^3
	91% segmented cells
	5% band forms
	2% monocytes
	1% basophils
	1% eosinophils
Hematocrit	39%
Platelets	278,000/mm^3
Prothrombin time	18.0 sec
Partial thromboplastin time	32.0 sec

Discussion — Nathan H. Carliner, M.D.

When I first read the protocol of this case, I asked myself: "Why was this case chosen for a discussion at a clinicopathologic conference?" Certainly I would not be asked to discuss a straightforward case of advanced mitral stenosis; so I assumed there was something unusual about the case to make it worthy of presentation.

The first step in differential diagnosis is to identify the key features of the case as I have attempted to do in **Table 3**. The final diagnosis chosen should, if possible, provide a satisfying explanation for all of these features. The patient was a 66-year-old woman with a long history of atrial fibrillation who presented with an acute illness characterized by cough and fever. The physical examination and echocardiogram established the presence of mitral stenosis and pulmonary hypertension. The echocardiographer also noted marked dilatation of the superior vena cava (SVC), right atrium (RA), and right ventricle (RV). The unusual features of the case are shown in **Table 4**. The age of 66 is very late for a patient with rheumatic mitral stenosis to first present with symptoms severe enough to prompt consideration of balloon valvuloplasty or surgical commissurotomy. In addition, the marked dilatation of the SVC, RA, and RV seems somewhat out of proportion to the degree of pulmonary hypertension, which was moderate.

Most mitral stenosis is rheumatic in origin, and this patient did, in fact, have a history of rheumatic fever. The initial attack of rheumatic carditis typically occurs in childhood or adolescence and is followed by an asymptomatic, latent period of 15 to 20 years[1] during which there is progressive narrowing of the mitral valve orifice. Eventually, the pressure in the left atrium and pulmonary capillary bed rises sufficiently to produce the typical symptoms of exertional dyspnea, cough, and hemoptysis. These symptoms increase rapidly in severity with marked limitation of exercise tolerance occurring within a few years.

At any given orifice size, the transvalvular pressure gradient is a function of the square of the transvalvular flow rate. Thus, a doubling of the flow rate across the mitral valve would quadruple the pressure gradient.[1] It is therefore not surprising that symptoms are often precipitated by factors that increase the mitral flow rate such as exercise, emotional stress, and infections. Two-thirds of patients with mitral stenosis are women, and they often first note symptoms during pregnancy, when the expanded plasma volume leads to an increase in the rate of flow across the valve. The ability of this patient to complete two full-term pregnancies without significant symptoms is therefore unusual.

The patient had pulmonary hypertension. Although mitral stenosis can by itself cause pulmonary hypertension, these patients are usually severely limited by exertional dyspnea, cough, and hemoptysis before the onset of

right ventricular failure causes these symptoms to be replaced by symptoms of low cardiac output, such as extreme fatigue and weakness. Thus, I suspect that this patient, in addition to mitral stenosis, had a coexistent condition that led not only to a decrease in the hemodynamic burden imposed by the obstruction to left atrial emptying, but also contributed to the pulmonary hypertension and marked right-sided cardiac dilatation that were demonstrated echocardiographically. The only physiologic abnormality that would satisfy both these conditions would be a left-to- right shunt above the level of the tricuspid valve. This would both decompress the left atrium and increase blood flow to the right side of the heart. Such a shunt could result either from an atrial septal defect or from partial anomalous pulmonary venous return to the right atrium.

The combination of rheumatic mitral stenosis and atrial septal defect occurs rarely and is known as Lutembacher's syndrome. The effect of an atrial septal defect or partial anomalous pulmonary venous return in the patient with mitral stenosis is to decompress the left atrium and thus delay the onset of symptoms of pulmonary venous congestion (e.g., dyspnea, cough, hemoptysis), which may be replaced by fatigue and weakness, reflecting the low cardiac output resulting from the decrease in left ventricular stroke volume. Patients with mitral stenosis and atrial septal defect or partial anomalous pulmonary venous return have increased left-to-right shunting leading to the earlier onset of right ventricular failure and atrial fibrillation.

It is logical to ask why a congenital left-to-right shunt would not be clinically evident early in life. This would certainly be the case with ventricular septal defect and patent ductus arteriosus, which expose the pulmonary circulation to systemic levels of arterial pressure. If these shunts are large and left uncorrected, Eisenmenger's syndrome of mark- ed pulmonary hypertension with right-to-left shunting, cyanosis, and clubbing will be evident by adolescence or early adult life. Few of these patients survive beyond the age of 30 years.[2] When the left-to-right shunt is above the level of the tricuspid valve the pulmonary circulation is not exposed to systemic levels of pressure. As a result, symptoms may not be present until the fourth or fifth decade. When diseases of aging such as hypertension and coronary artery disease produce left ventricular dysfunction, the left atrial pressure rises, causing an increase in the left-to-right shunt with the eventual development of atrial fibrillation, right ventricular failure, and pulmonary hypertension.

There are three types of atrial septal defects. The most common (70% of cases) is the ostium secundum defect, which is located in the region of the fossa ovalis. Next most common (20% of cases) is the ostium primum defect, which is located in the lower portion of the atrial septum and is usually associated with a cleft in the mitral valve. Least common (10% of cases) is the sinus venosus defect, which is located superiorly and posteriorly near the superior vena cava. Sinus venosus defects frequently occur (up to 85% of cases) in combination with partial anomalous pulmonary venous return. Ostium secundum and ostium primum defects are generally easy to demonstrate by transesophageal echocardiography[3] (TEE) and were not noted in this patient. Sinus venosus defects are more difficult to visualize unless

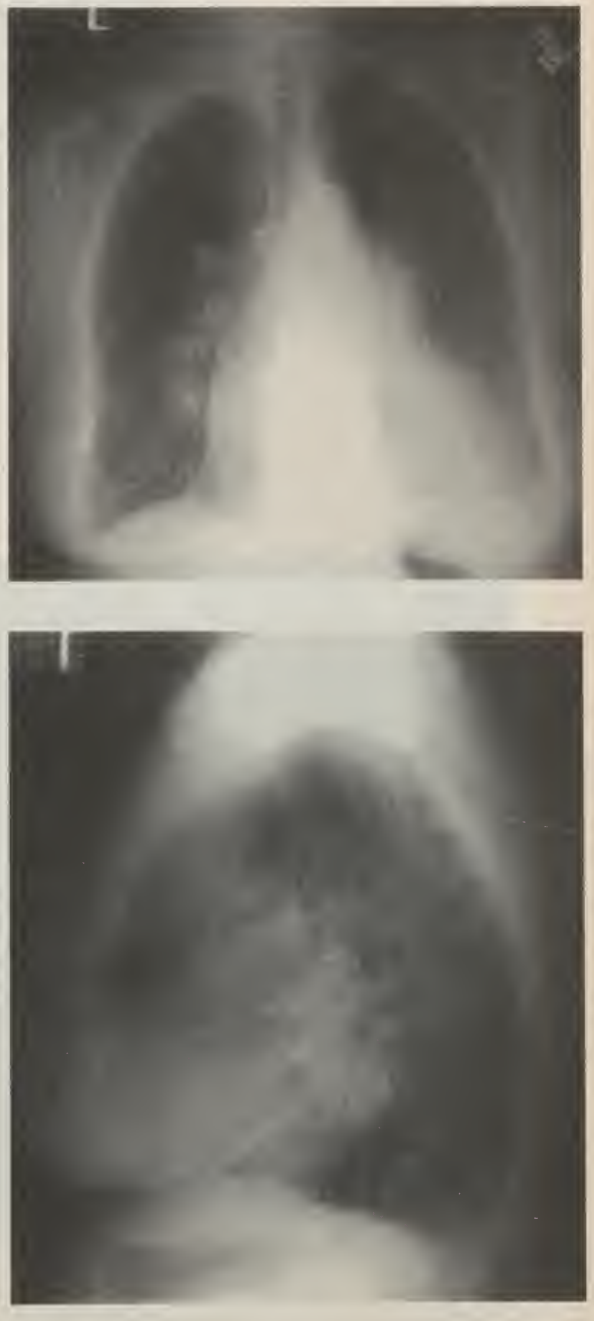


FIGURE 1. PA and lateral chest x-ray on admission.

particular attention is directed to interrogating the upper and posterior portion of the atrial septum. This should always be done when the presence of atrial fibrillation or right-sided cardiac dilatation leads to the clinical suspicion of atrial septal defect.

In partial anomalous pulmonary venous connection one or more pulmonary veins do not drain into the left atrium but instead connect to the right atrium or one of its major venous tributaries. Most commonly a right-sided pulmonary vein connects to the superior vena cava or right atrium with the connection of the right upper pulmonary vein. The superior vena cava is the most frequent in a recent series (48.5% of all cases).[4] Although angiography was formerly required to make this diagnosis, a recent paper from the Mayo Clinic describes techniques that have allowed the diagnosis to be made reliably by TEE.[4]

TABLE 2. Catheterization data

Site	Oximetry	Pressure (mm Hg)
SVC	66%	-
IVC	69%	-
Right atrium	80%	6
Right ventricle	80%	58/8
Pulmonary artery	81%	58/22
Pulmonary wedge	-	18
Anomalous right superior pulmonary vein	98%	-
Left ventricle	-	120/4
Cardiac output	4.0 liters/min (Fick method)	

In summary, I suspect that in this patient with mitral stenosis the late onset of severe symptoms is explained by the pressure of a left-to-right shunt above the level of the tricuspid valve. Since an atrial septal defect was not demonstrated by TEE, the shunt was probably the result of a partial anomalous pulmonary venous connection. Statistically, the most likely connection is the right upper pulmonary vein to the superior vena cava. I would not be surprised if there was a small sinus venosus atrial septal defect (which had been missed by transesophageal electrocardiogram) since sinus venosus defects and partial anomalous pulmonary venous connection so often occur in combination. The patient had had three prior episodes of pneumonia and it was most likely a fourth episode that precipitated her admission to the hospital.

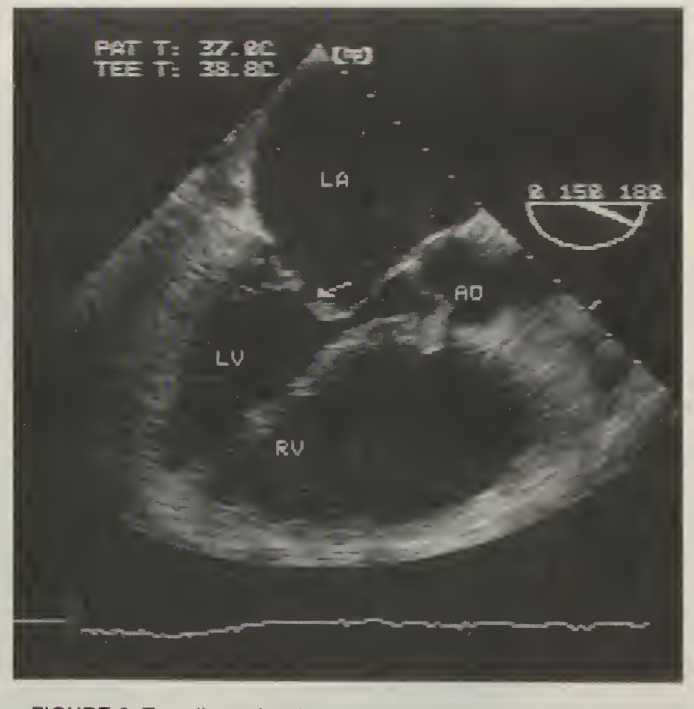


FIGURE 2. Two-dimensional transesophageal echocardiogram. The arrow denotes the anterior mitral valve leaflet, which is thickened and "domes" during diastole, creating the typical "hockey-stick" deformity of the rheumatic mitral valve.

TABLE 3. Key features

- Mitral stenosis with atrial fibrillation
- Pulmonary hypertension with marked dilatation of SVC, RA, and RV
- Cough and fever

Diagnosis made by Nathan H. Carliner, M.D.: **mitral stenosis, with associated partial anomalous pulmonary venous return**

FIGURE 3. Angiogram demonstrating anomalous right superior pulmonary vein draining into the confluence of the right atrium and the superior vena cava.

Diagnosis and clinical course

A right-and-left heart catheterization was performed. During the right-heart catheterization an anomalous vessel was entered which drained into the superior vena cava, and angiography revealed an anomalous right superior pulmonary vein (**Figure 3**). Pressures and oximetry are shown in **Table 2** which is notable for an oxygen saturation "step-up" between the SVC and the pulmonary artery, indicative of a left-to-right shunt. The pulmonary to systemic flow ratio was calculated at 1.5:1 (normal, 1:1) and the pulmonary vascular resistance was calculated at 2.5 Wood's units (normal, 0.25-1.6). Severe mitral stenosis was documented, with a calculated mitral valve area of 0.95 cm^2. Because of the partial anomalous pulmonary venous return and severe tricuspid regurgitation, the patient underwent surgery, at which time a baffle was created between the right superior pulmonary vein and the left atrium, a tricuspid ring annuloplasty was performed, and a tilting bileaflet prosthesis was placed in the mitral position. The patient improved symptomatically, but has continued to require diuretics for management of peripheral edema.

TABLE 4. Unusual features

- Late presentation of symptoms of severe MS
- Marked dilatation of the SVC, RA, and RV with only moderate pulmonary hypertension.

References

1. Braunwald E. Valvular heart disease. In Braunwald E (ed): *Heart Disease,* 5th ed. Philadelphia, PA: W.B. Saunders Co., 1997.
2. Guntheroth WG. Ductus arteriosus and ventricular septal defect in the adult. In Chatterjee K, Cheitlin MD, Karliner J, et al (eds): *Cardiology: Review Edition.* New York, NY: Grover Medical Publishing, 1991.
3. Feigenbaum H. Congenital heart disease. In Feigenbaum H (ed): *Echocardiography,* 5th ed. Philadelphia, PA: Lea & Febiger, 1994.
4. Ammash NM, Seward JB, Warnes CA, et al. Partial anomalous pulmonary venous connection: diagnosis by transesophageal echocardiography. *J Am Coll Cardiol* 1997; 29:1351–1358. ■

Utilization of computed tomography in patients hospitalized with community-acquired pneumonia

Douglas P. Beall, M.D., William W. Scott, Jr., M.D., Janet E. Kuhlman, M.D., Lawrence V. Hofmann, M.D., Richard D. Moore, M.D., and Linda M. Mundy, M.D.

Drs. Beall, Scott, and Hofmann are from the department of radiology, and Dr. Moore is from the division of general internal medicine, The Johns Hopkins Hospital, Baltimore, Maryland. Dr. Kuhlman is from the department of radiology, University of Wisconsin Hospital, Madison, Wisconsin, and Dr. Mundy is from Washington University, St. Louis, Missouri.

ABSTRACT: *The objective of the study was to assess the frequency of the use of chest computed tomography in 385 adults hospitalized with community-acquired pneumonia and determine whether the computed tomography examinations yielded additional diagnostic information. Also, if additional information was obtained, the study determined whether it changed the patient's treatment plan.*

Community-acquired pneumonia (CAP) results in substantial health care expenditures. The United States Department of Health and Human Services estimates two million cases per year with over 750,000 hospital admissions. CAP remains the sixth most common cause of death in the United States.[1,2]

The patient history, physical examination, chest roentgenogram (CXR), and the sputum Gram stain (if obtainable) guide the initial selection of antibiotic therapy. In 1995, we reported the etiologies of CAP in 385 adult hospitalized patients, 221 (57%) of whom were immunocompromised.[3] As with others, we also reported overlap in clinical presentation between patients with bacterial pneumonia and atypical agents, making the history and physical examination somewhat unreliable for therapeutic decisions.[4,5] Two studies have demonstrated that certain CXR findings may suggest an etiology, but these have been less than accurate parameters upon which to guide therapeutic decisions.[6,7] Additionally, the studies included only immunocompetent patients who were consequently less likely to present with an atypical pathogen.

TABLE 1. New findings on CT examination

FINDINGS	PATIENTS		
	Immunocompetent n=28	HIV-infected n=31	Immunosuppressed* n=9
	No. (%)	No. (%)	No. (%)
Excluded mass	4 (14.3%)	5 (16.1%)	0 (0%)
Confirmed mass	3 (10.7%)	1 (3.2%)	3 (33.3%)
Cavity	2 (7.1%)	5 (16.1%)	0 (0%)
Pleural effusion	7 (25%)	0 (0%)	0 (0%)
Adenopathy	4 (14.3%)	2 (6.5%)	1 (11.1%)
Disease extent	1 (3.6%)	3 (9.7%)	0 (0%)
Character of infiltrate	4 (14.3%)	4 (12.9%)	2 (22.2%)
Tube placement	1 (3.6%)	1 (3.2%)	0 (0%)
Not useful	12 (42.9%)	17 (54.8%)	4 (44.4%)

Note: CT scans may show more than one new finding per scan.
*Immunosuppressed due to concurrent malignancy, organ transplant, hypogammaglobulinemia, or immunosuppressive drug regimen

American Thoracic Society guidelines suggest that computed tomography (CT) may be useful in the evaluation of patients who fail to improve in the expected manner with standard therapy. Pleural effusion, cavitation within a pneumonia, and multiple lung nodules are mentioned as types of additional information obtained.[8] Until now there have been no data available concerning the frequency with which CT examination is employed in patients hospitalized with CAP or whether the results of such CT examinations provide useful information.

A recent study of CAP conducted at our institution permitted us to determine 1) the frequency of use of chest CT in CAP, 2) whether CT examinations yielded additional diagnostic information, and 3) what additional information obtained changed the treatment plan for the patient.

Materials and methods

All adult patients admitted to our hospital (a tertiary-care center) with CAP over a one-year period from November 14,1990, through November 13, 1991, were eligible for inclusion in the study. CAP was defined as pneumonia presenting in a noninstitutionalized individual. The methods have been previously published.[3] The clinical services requested CT at their own discretion; they were unaware of the study.

Conventional CT was performed using a Siemens Somatom Plus scanner (Iselin, NJ), obtaining 1-sec scans with 8-mm slices every 8 mm from the thoracic inlet to the lung bases. Imaging factors were set at 120 kVp and 250 mA. Contrast-enhanced scans were obtained using 100 ml of Omnipaque 300 (Nycomed, New York, NY) administered through a 21-gauge catheter via an antecubital vein. A power injector (Medrad Inc., Pittsburgh, PA) was used with an injection rate of 2ml/sec.

The CXRs used for comparative purposes were those performed most closely preceding the time of CT. A lateral CXR was done in 50 of 68 (74%) patients and a frontal view only was obtained in 18 of 68 (26%) patients due to the patients' conditions and/or physicians' preferences.

Images, reports, and clinical impact

The plain CXR and CT scans of all patients obtained during admission were reviewed by one or more board-certified diagnostic radiologists. In cases where CT examination was obtained, the most closely preceding CXR was selected for evaluation in conjunction with the CT scan. The time interval between these exams was recorded. The official reports for these examinations were also reviewed at the same time. The findings, as determined from the official CXR report, were used for comparison with the information provided by the CT exam. The types and frequencies of new information provided by CT were tabulated. The following categories were utilized for new information provided by CT:

1) excluded an underlying mass suspected on CXR by history
2) demonstrated a previously unrecognized mass
3) demonstrated a cavity not seen on CXR
4) demonstrated pleural fluid not seen on CXR
5) demonstrated adenopathy not seen on CXR
6) demonstrated a markedly different extent of disease than shown on CXR
7) demonstrated the alveolar/nodular/interstitial or other character of the opacification better than shown on CXR
8) demonstrated precisely the positioning of a pleural tube not adequately localized by CXR

A CT scan on a patient may demonstrate new findings in more than one category.

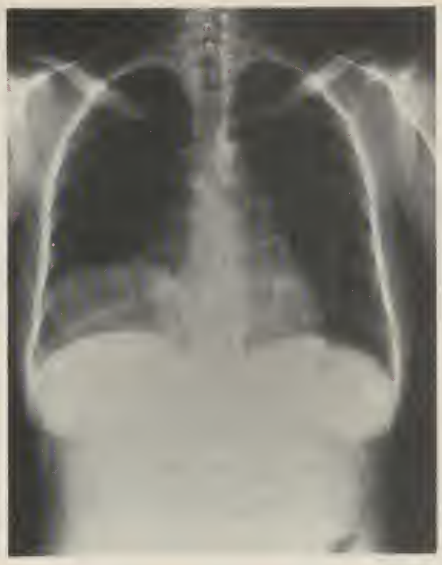
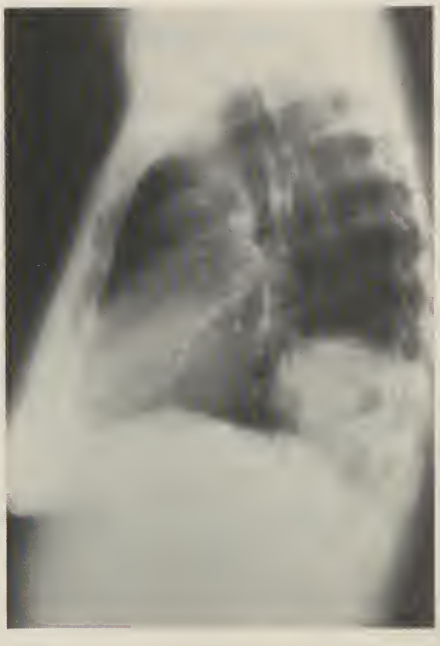


Figure 1a, 1b. A 26-year-old HIV-positive woman with a dense infiltrate in the posterior portion of the right lower lobe on CXR.



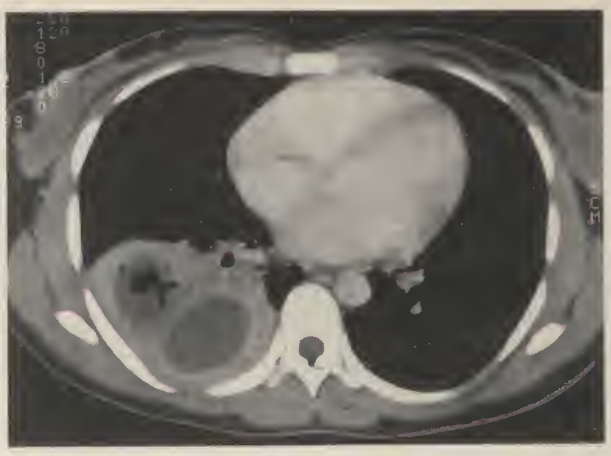


Figure 1c. CT scan demonstrated fluid and air in the center of this infiltrate compatible with lung abscess.

Chart review

The medical records of all patients with CT scans were examined and the clinical scenario for each was recorded. If a change in the patient's treatment plan was initiated as a result of the new information from the CT, as noted in the patient's record, the type of change and the finding(s) causing treatment alteration were documented.

Results

Sixty eight of 385 hospitalized adults (17.7%) underwent chest CT. Nine of 68 (13.2%) received intravenous contrast and the remaining 59 (86.8%) did not. The decision to obtain an intravenous contrast-enhanced scan was no different than the established routine scanning protocol. The time intervals between the CT scans and the preceding CXRs to which they were compared averaged 43 hours with a range of 1 hour to 151 hours. For studies that showed new findings, the average time was 37.6 hours with a range of 1 hour to 125 hours. For studies that did not show new findings, the average time interval was 49.7 hours with the range between 1 hour and 151 hours.

The new findings provided by CT, grouped by patient immunological status, are presented in **Table 1**. CT was performed in 28 of 164 (17.1%) immunocompetent patients and additional significant findings were identified in 17 of these 28 patients (60.1%). CT was performed in 31 of 180 (17.2%) HIV-infected patients with new findings identified in 15 patients (48.4%). In the non-HIV immunosuppressed patients, CT was performed in 9 of 41 (22%) with additional findings noted in 5 patients (58%). Some patients had more than one important new finding on CT.

The most frequent new finding demonstrated by CT varied among the patient groups. In the immunocompetent group, evidence of pleural effusion was most often noted. In the HIV-infected group, demonstration of a cavity and exclusion of a mass suspected on CXR were the most frequent new findings. In the non-HIV, immunosuppressed group, demonstration of a mass not previously diagnosed was the most common new finding. **Figures 1, 2, and 3** show CXR and CT images in three cases where the CT provided additional useful information. Of the 68 patients that underwent chest CT, 54 had adequate documented clinical information to determine whether CT changed patient therapy. A change in treatment plan due to new information provided by CT was seen in 21 of the 54

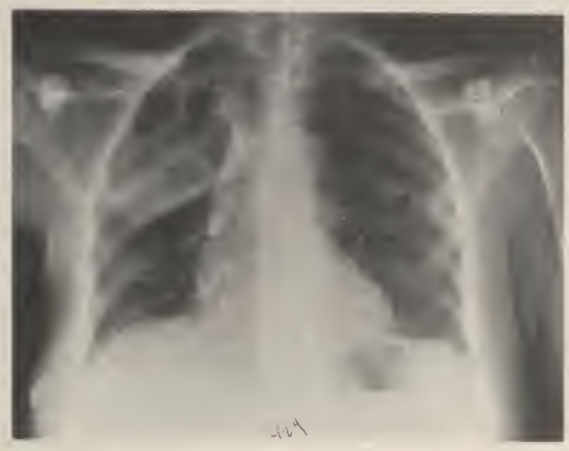


FIGURE 2a. This 62-year-old immunocompetent woman had a right upper lobe infiltrate on CXR. There was also a density of uncertain significance near the left lateral chest wall.

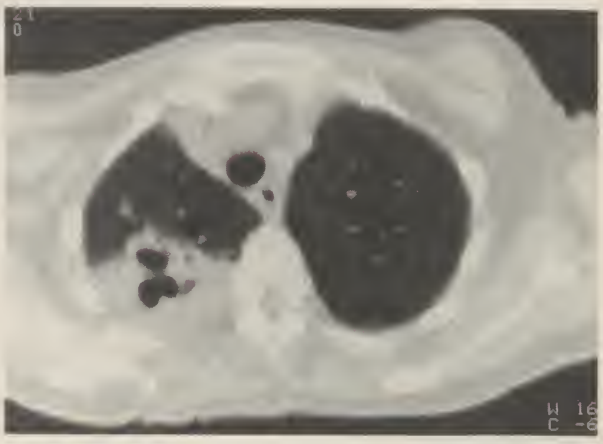


FIGURE 2b. CT scan showed the infiltrate to be cavitary.

patients (39%). The new information obtained from the CT examination that initiated the change in treatment plan is listed in **Table 2**.

The treatment plan was altered in 11 of 29 immunocompromised patients (38%) and in 10 of 25 immunocompetent patients (40%).

Discussion

This study reveals the frequent use of chest CT in adults hospitalized in a large metropolitan area. Clinicians ordered this test for patients based on their clinical judgment; before this there were no data available on the use and usefulness of CT in this setting. Clinicians, therefore, have had to rely only on clinical acumen when considering CT in their patients hospitalized with CAP.

Outwardly, the use of CT in CAP may appear to have questionable diagnostic utility. Seventy-five percent of pneumonias are treated on an ambulatory, outpatient basis.[9] However, CT is usually employed in more severe, complicated cases requiring hospitalization for treatment. In this setting, diagnostic procedures that yield additional diagnostic information about the disease process, over and above that provided by the conventional chest radiograph, can shorten hospital stays, cut costs, and potentially improve patient outcome.[10,11]

CT has the potential to alter patient management. Certain types of findings revealed by CT frequently require that clinical actions be taken. We established the following categories of such findings to aid in objective evaluation of the usefulness of CT.

1) CT may reveal a considerably different extent of disease than is apparent on CXR. This may place the patient in a different prognostic category, requiring revision of treatment plans.
2) CT may reveal nodularity or interstitial/alveolar components of a pneumonia not suspected on CXR. The type of opacity may prompt consideration of a pathogen not previously suspected.[12] (See **Table 3** for the etiology of the CAPs in our group of hospitalized patients.) In one study,[13] percutaneous biopsy of focal opacities in patients with AIDS had a high diagnostic yield, while it is generally recognized that percutaneous biopsy of a diffuse pulmonary opacities is rarely diagnostic. The type of infiltrate could thus determine whether or not percutaneous biopsy will be done.
3) The detection of pleural fluid identifies a potential source for specific microbial identification which may lead to more specific antibiotic therapy. Pleural fluid uncommonly accompanies *Pneumocystis carinii* pneumonia. Its presence may lead to consideration of alternative diagnoses. CT provides sensitive detection of even small quantities of pleural fluid, even when loculated. It accurately localizes fluid collections for diagnostic aspiration or drainage. It may show extensive

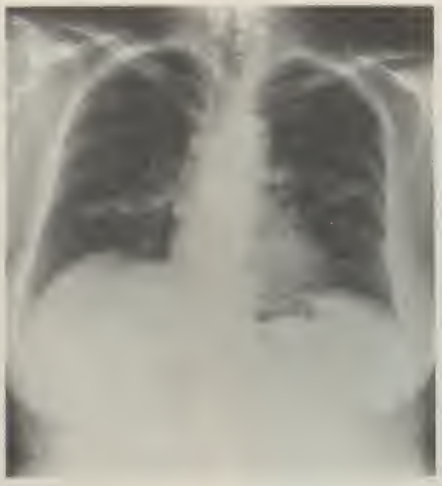


FIGURE 3a. This febrile 63-year-old woman was being treated with steroids for CREST syndrome. PA chest radiograph showed linear atelectasis in the mid lungs bilaterally and a possible infiltrate in the right lower lung.

TABLE 2. CT findings and changes in treatment

Finding	Change in Treatment	Frequency of Finding Causing Change (n=21) No.%
Demonstrated character of infiltrate different than seen on CXR	Antibiotic therapy altered	6 (29%)
Demonstrated infiltrate vs. mass	Bronchoscopy/CT guided biopsy done	4 (19%)
Demonstrated loculated pleural effusion	Chest tube placed for pleural drainage	3 (14%)
Demonstrated pleural effusion not seen on CXR	Thoracentesis done	3 (14%)
Demonstrated inadequate placement of chest tube to drain existing fluid	Tube manipulated	2 (10%)
Demonstrated tumor recurrence	Chemotherapy/surgery done	1 (5%)
Cavitary lesion found to be necrotizing	Workup begun to differentiate necrotizing pneumonia vs. autoimmune cause of vasculitis	1 (5%)
Demonstrated post-op changes compatible with inflammation	Anti-inflammatory medications initiated	1 (5%)

loculation, necessitating surgical rather than tube drainage. CT is quite accurate in the differentiation of empyema and lung abscess, which require different therapies (empyema requiring drainage.)[14]

4) CT may show the reason for failure of pleural drainage by accurately demonstrating the relationship of a pleural tube and residual fluid.[15]
5) Demonstration of cavitation within an opacity indicates a necrotizing pneumonia and may lead to a change in antimicrobial therapy.

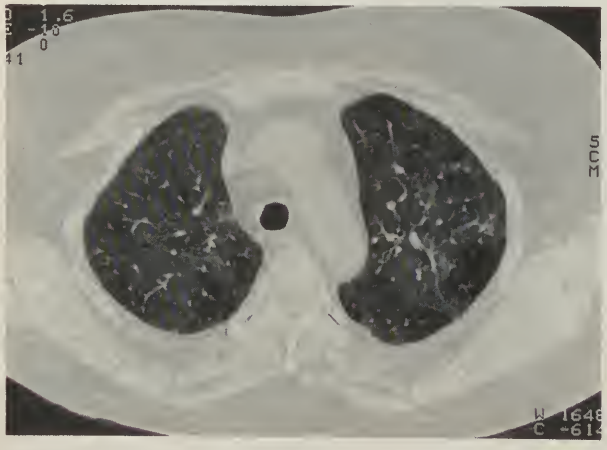


FIGURE 3b. CT scan, in addition to emphasizing the linear nature of the lower lung changes, showed extensive "ground glass" infiltrates in both upper lungs suspicious for *Pneumocystis carinii* or *cytomegalovirus* pneumonia.

6) Detection of a mass associated with pneumonia or differentiation of mass and focal opacity frequently leads to a biopsy for diagnosis. CT can aid in selection of the most appropriate method of biopsy (i.e., bronchoscopic vs. percutaneous).
7) CT can reliably exclude the presence of a mass suspected on clinical grounds or on the basis of CXR findings and obviate the need for further diagnostic procedures.
8) The demonstration of adenopathy may lead to consideration of unusual pneumonia or an underlying neoplasm.

Detection of certain findings may lead to a change in the treatment plan, therefore, these findings were designated as being clinically useful. If these findings were seen on CT alone, it can be assumed that the CT rendered the diagnostic information necessary to induce a change in the patients' treatment.

The clinical information obtained from the patients' medical records illustrated that certain findings initiated a change in the treatment plan (see **Table 2**). Some findings were relatively common (i.e., the character of the opacity was seen to be different on CT than on CXR) and the information obtained from the CT scan initiated a change in therapy in nearly 40% of the patients examined. The alteration in treatment plan was seen as often in the immunocompetent patients as in the

Table 3. Etiology of community-acquired pneumonia in 385 hospitalized patients.

Diagnosis*	Definitive	Presumed	Total, No. (%)
Staphylococcus pneumonia	31	38	69 (17.9)
Pneumocystis carinii (PCP)	48	1	49 (12.7)†
Haemophilus influenzae (type b)	3	25	28 (7.3)
Gram-negative bacilli‡	8	18	26 (6.8)
Viral§	12	3	15 (3.9)
Chlamydia pneumoniae	14	0	14 (3.6)
Staphylococcus aureus	3	10	13 (3.4)
Legionella species‖	9	4	13 (3.4)
Mycobacterium tuberculosis	9	0	9 (2.3)
M. catarrhalis	0	6	6 (1.6)
Fungal (non-PCP)¶	4	1	5 (1.3)
Other#	7	3	10 (2.6)
Aspiration	0	35	35 (9.1)**
Unknown	0	93	93 (24.2)††

* Unless indicated, there was no statistically significant difference between HIV+ and HIV- patients.

† 48 (26.7%) were HIV+ compared with 1 (0.5%) of HIV- patients; $p < 0.001$.

‡ 11 *Pseudomonas aeruginosa*, 6 *Klebsiella pneumoniae*, 3 *Enterobacter*, 2 *Escherichia coli*, 2 *Acinetobacter*, 1 *Proteus*, 1 *Citrobacter*.

§ 4 Adenovirus, 1 influenza A, 6 influenza B, 1 parainfluenza II, 2 cytomegalovirus, 2 varicella-zoster virus.

‖ 11 *L. pneumophila* serogroup 1-6, 2 *L. pneumophila* serogroup 1.

¶ 1 *Cryptococcus neoformans*, 1 *Histoplasma*, 1 *Aspergillus*, 2 *Candida albicans* (with malignancy).

1 group A *streptococcus*, 2 *streptococcus* other, 2 M. *avium* complex, 1 *M. kansasii*, 2 anaerobes (with empyema), 1 *C. psittaci*.

** 29 (14.1) were HIVD compared with 5 (2.8) of HIV+ patients; $p < 0.001$.

†† 76 (37.1) were HIVD compared with 46 (25.6) of HIV+ patients; $p < 0.001$.

immunocompromised group despite the difference in the type of new findings identified.

A major limitation of our study was the time between the comparative CXR and the CT. Ideally, a control CXR would have been taken immediately before the chest CT.

By examining the results of our study, in terms of the type and frequency of new diagnostic information obtained, it may be possible to further define the selection of patients in which CT will prove useful. The physician faced with a poorly responding patient might debate whether or not therapy would be changed if CT revealed a previously unsuspected cavity, mass, nodular opacity, pleural effusion, misplaced pleural tube, or one of the other important findings described in this study. If none of these findings would cause a change in plan, then a CT should not be done.

In conclusion, we believe there is a role for CT examination in the evaluation of patients hospitalized with CAP in a tertiary care referral center. A knowledge of what is likely to be found and how often these findings are seen may assist the clinician in deciding when CT examination should be performed.

References

1. Inpatient utilization of short-stay hospitals by diagnosis. U.S. 1982 Annual Summary. National Center for Health Statistics, USDHHS Data from the National Health Survey, Series 13, No. 72 (PHS 83-1733), Washington, D.C., 1983.
2. Statistical Abstract of the U.S. 108 ed. U.S. Dept. of Commerce, Bureau of Census, Washington, D.C., 1988.
3. Mundy LM, Auwaerter PG, Oldach D, et al. Community-acquired pneumonia: impact of immune status. *Am J Respir Crit Care Med* 1995;152:1309–1315.
4. Fang G, Fine M, Orloff J, et al. New and emerging etiologies for community-acquired pneumonia with implications for therapy. *Medicine* 1990;69:307-316.
5. Mundy LM, Auwaerter PG, Oldach D, et al. Atypical pathogens of community-acquired pneumonia: implications for macrolide treatment. *Clin Infect Dis,* in press.
6. Tew J, Calenoff L, Berlin BS. Bacterial or nonbacterial pneumonia: accuracy of radiographic diagnosis. *Radiology* 1977; 124:607–612.
7. Macfarlane JT, Miller AC, Roderick-Smith WH, et al. Comparative radiographic features of community acquired Legionnaires' disease, pneumococcal pneumonia, mycoplasma pneumonia, and psittacosis. *Thorax* 1984;39:28–33.
8. American Thoracic Society. Guidelines for initial management of adults with community-acquired pneumonia: diagnosis, assessment of severity, and initial antimicrobial therapy. *Am Rev Respir Dis* 1993;148:1418–1426.
9. Bartlett JG, Mundy LM. Community-acquired pneumonia. *N Engl J Med* 1995;333:1618–1624.
10. Diefenthal HC, Tashjian J. The role of plain films, CT, tomography, ultrasound, and percutaneous needle aspiration in the diagnosis of inflammatory lung disease. *Semin Respir Infect* 1988;3:83–105.
11. Gross BH, Spizarny DL. Computed tomography of the chest in the intensive care unit. *Crit Care Clin* 1994;10:267–275.
12. Kuhlman JE, Madhav Kavuru BA, Fishman EK, Siegelman SS. *Pneumocystis carinii* pneumonia: spectrum of parenchymal CT findings. *Radiology* 1990;175:711–714.
13. Scott WW, Jr, Kuhlman JE. Focal pulmonary lesions in patients with AIDS: percutaneous transthoracic needle biopsy. *Radiology* 1991;180:419–422.
14. Stark DD, Federle MP, Goodman PC, et al. Differentiating lung abscess and empyema: radiography and computed tomography. *AJR* 1983;141:163–167.
15. Stark DD, Federle MP, Goodman PC. CT and radiographic assessment of tube thoracostomy. *AJR* 1983;141:253–258.

■

Flush resuscitation for Group A streptococcus toxic shock: a possible role for continuous renal replacement therapy and plasmapheresis

Charles E. Wiles III, M.D., H. Neal Reynolds, M.D., and Yaron Bar-Lavie, M.D.

Disease desperate grown, by desperate appliance are relieved.

— Shakespeare, W., Hamlet. IV:3:9-10.

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ABSTRACT: *Group A streptococcus has emerged as a major cause of aggressive life-threatening deep-seated infections. In addition, toxic shock syndrome caused by Group A streptococcus was recognized in 1983. Group A streptococcus produces several potent exotoxins which explain the pathophysiology of these invasive infections. Other virulence factors such as M protein, which can impede phagocytosis, are associated with some Group A streptococcus. M protein and streptococcal pyrogenic exotoxins may act as superantigens. Host factors may influence the severity of infection.*

Blood purification techniques such as continuous renal replacement therapy and plasmapheresis can remove streptococcal exotoxins as well as inflammatory mediators. Replacement with fresh-frozen plasma corrects coagulopathy and may provide some antibody protection.

Four patients with Group A streptococcus-toxic shock syndrome treated with continuous renal replacement therapy, plasmapheresis, or both showed dramatic, rapid improvement in cardiovascular dynamics and respiratory parameters. Two patients died.

The mainstay of treatment for Group A streptococcus-toxic shock syndrome remains early diagnosis, aggressive surgical control of the infection, and appropriate antibiotics (i.e., penicillin and clindamycin). Flush resuscitation may rescue some patients from profound toxic shock. The mechanisms of action need to be delineated.

Blood purification techniques such as continuous renal replacement therapy (CRRT) and plasmapheresis have been reported to be rational and effective in treating severe sepsis.[1,2] This paper describes one center's experience with flush resuscitation using these techniques for toxic shock produced by Group A-β hemolytic streptococcus infections. The R Adams Cowley Shock Trauma Center of the University of Maryland Medical System is the primary adult trauma resource center for Maryland. Its hyperbaric medicine department also serves as a tertiary referral service for an area covering several states and the nation's capital. Patients with severe necrotizing surgical infections, including streptococcal infections, are accepted for evaluation and treatment.

TABLE 1. Physiologic improvement

Parameter	Before CRRT	Post CRRT
PaO_2/FiO_2	51	292
pH	7.23	7.38
Pulmonary shunt	45%	15%
Prothrombin time (sec)	13.8	12.6
Partial thromboplastin time (sec)	59	32
Mean art. pressure (mmHg)	60	90
Heart rate (beats/min)	142	112
Cardiac index (1/min/m^2)	3.5	3.9
Pulmonary artery occlusion pressure (mm Hg)	23	26
Epinephrine (mg/kg/min)	15	0
Dobutamine (mg/kg/min)	10	5
Dopamine (mg/kg/min)	9	3

Clinical experience

The first patient in our experience with CRRT for toxic shock syndrome (TSS) developed severe heart failure during resuscitation from shock and hemolysis. Massive volumes of crystalloid solutions, fresh-frozen plasma, red blood cells, and platelets were needed along with high doses of epinephrine and other cardiotonic agents. Continuous venovenous hemofiltration was instituted to remove excess fluid. The patient stabilized over several hours. Pulmonary gas exchange dramatically improved. Coagulation was restored. Inotropic drug requirements fell and the patient's cardiovascular system became functional. The patient survived and was subsequently shown to have a Group A streptococcus (GAS) infection.

The second patient with GAS-TSS was begun early on CRRT. Pulmonary shunt fell to one-third of pretreatment values. Mean arterial pressure normalized. Vasoactive catecholamine doses were substantially reduced. The patient survived. Data observed are presented in **Table 1**.

Two patients with GAS-TSS were treated with plasmapheresis. Both patients survived. Improvement occurred more rapidly than with continuous hemodiafiltration.

Two other patients with GAS infections and profound shock died. One was begun on CRRT late in his course, after multiple organ failure was firmly established. The other patient expired shortly after arrival in shock to the hospital. Streptococcal pneumonia was diagnosed post mortem.

Discussion

GAS has emerged as a major cause of deep-seated aggressive life-threatening infections. Willoughby and Greenberg recognized the association of TSS with β-hemolytic streptococcus infections.[3] Group B streptococcus-toxic shock syndrome has subsequently been reported.[4] The mortality rate for GAS-TSS exceeds 30%, with mortality rates for deep-seated streptococcal infections reaching 85%.[5]

Streptococci produce disease by tissue invasion, immunologic mechanisms, and toxin production. Streptococcal exotoxins include hemolysins and pyrogenic (erythrogenic) exotoxins (molecular weight, 12,000–40,000).[6] They also produce M proteins and perhaps other virulence factors. The pyrogenic exotoxins and M proteins may act as superantigens, provoking the immune response without full antigen processing.[7]

Penicillin and aggressive surgical debridement of necrotic tissue remain the mainstays of therapy for streptococcal infections. Hyperbaric oxygen has been used in some centers. Since bacterial destruction may in fact increase the toxin load to the patient, a bacteriostatic antibiotic, clindamycin, which also inhibits exotoxin and M protein synthesis, has been recommended either alone or in combination with penicillin.[8]

None of these modalities addresses the systemic toxic effect of streptococcal infections. Therapy of toxic shock, for instance, remains supportive until the infection can be eliminated or the patient expires. Specific immune therapy against all the toxic and virulence factors produced by the streptococcus is probably not realistic although gamma globulin has been used.[9]

Blood purification techniques such as CRRT and plasmapheresis have theoretical appeal. The filters used for CRRT remove particles up to 40,000 daltons. This includes most mediators of the systemic inflammatory response.[10] Plasmapheresis removes substances up to 3,000,000 daltons and returns to the patient under treatment pooled donor plasma, which may contain antibodies to streptococcal toxins and virulence factors.

Conclusion

The keys to successful treatment of toxic streptococcal shock syndrome remain early diagnosis and early very aggressive surgical debridement. The antibiotics of choice are a combination of penicillin, in high doses, and clindamycin. Patients in shock may respond favorably to CRRT or plasmapheresis if these techniques are available. Further investigation of the pathophysiology of toxic streptococcus shock syndrome is indicated.

References

1. Baczilay E, Kessler D, Berlot G, et al. Use of extracorporeal supportive techniques as additional treatment for septic-induced multiple organ failure patients. *Crit Care Med* 1989;17:634–637.
2. Pollack M. Editorial response: blood exchange and plasmapheresis in sepsis and septic shock. *Clin Infect Dis* 1992;15:431–433.
3. Willoughby R, Greenberg RN. The toxic shock syndrome and streptococcal pyrogenic exotoxins. *Ann Intern Med* 1983;98:559.
4. Schlievert PM, Gocke, JE, Deringer JR. Group B streptococcal toxic-shock like syndrome: report of a case and purification of an associated pyrogenic toxin. *Clin Infect Dis* 1993;17:26–31.
5. Stevens DL. Invasive group A streptococcus infections. *Clin Infect Dis* 1992;14:2–13.
6. Hauser AR, Stevens DL, Kaplan EL, Schlievert PM. Molecular analysis of pyrogenic exotoxins from *Streptococcus pyogenes* isolates associated with toxic shock-like syndrome. *J Clin Microbiol* 1991;29:1562–1567.
7. Hackett SP, Stevens DL. Superantigens associated with staphylococcal and streptococcal toxic shock syndrome are potent inducers of tumor necrosis factor-B synthesis. *J Infect Dis* 1993;168:232–235.
8. Stevens DL. Streptococcal toxic-shock syndrome: spectrum of disease, pathogenesis, and new concepts of treatment. *EID* 1995;1:69–78.
9. Barry W, Hudgins L, Donta ST, Pesanti EL. Intravenous immunoglobulin therapy for toxic shock syndrome. *JAMA* 1992;267:3315–3316.
10. Elliot D, Wiles CE, Reynolds HN. Clearance of cytokines by CAVH-D/CVVH-D. Letter to the editor. *Crit Care Med* 1994;22:718–719. ■

THE GENESIS OF CARDIOPULMONARY RESUSCITATION

by Joseph M. Miller, M.D.

Cardiopulmonary resuscitation (CPR), a life-saving measure that has its beginnings deeply rooted in Maryland, has gained therapeutic acceptance throughout the world. Closed cardiac defibrillation and closed cardiac massage were first explored, explained, and used at Johns Hopkins Hospital.[1-7] The contributions of the primary investigators — Jerome H. Kay, William B. Kouwenhoven, James Jude, and G. Guy Knickerbocker — are often unknown.

Dr. Jerome H. Kay worked in the experimental animal laboratory of the Johns Hopkins School of Medicine. He became interested in cardiac arrest and eagerly sought an effective method of treatment. In his preliminary research on fibrillation, Dr. Kay noted Dr. William Kouwenhoven, dean of the School of Engineering at the Johns Hopkins University, had researched ventricular fibrillation. These initial experiments, done in the 1920s, confirmed previous findings by others that ventricular fibrillation could be arrested by electric shock. Dr. Kay asked Dr. Kouwenhoven to create an apparatus that could shock the fibrillating heart.

The initial experiments on cardiac resuscitation were done through an open chest operation; the electrodes were applied directly to the heart. Fibrillation was produced by a 30-volt current. The heart was then firmly and rhythmically squeezed at a rate of 40 to 50 times per minute. After a period of massage, the heart was defibrillated by a 130-volt, 60-cycle alternating current applied for one second or less.

External defibrillation became their goal. Dr. G. Guy Knickerbocker, who joined Dr. Kouwenhoven's staff, noted that an increased amount of pressure on the chest by an external electrode would produce a pulse-like wave on the electrocardiogram. He then wondered if he could massage the heart by external compression.

Serendipity entered the experiments at this stage. In an unrelated experiment, a dog in the animal laboratory experienced cardiac fibrillation. Dr. Knickerbocker used external chest compressions to defibrillate the heart and the animal recovered. This was the first time cardiac circulation was restored with a closed-chest massage. In 1958, Dr. Henry T. Bahnson first used the method successfully to resuscitate a child and then, late that same year, Dr. James Jude successfully resuscitated a 40-year-old woman.

Drs. James O. Elam and Peter J. Safar, from Baltimore City Hospital (now Johns Hopkins Bayview), perfected the mouth-to-mouth method of forced respiration of the lungs. The combination of closed chest massage, forced respiration, and ventricular defibrillation, if necessary, is now known as CPR.

References

1. Kouwenhoven WB, Kay JH. A simple electrical apparatus for the clinical treatment of ventricular defibrillation. *Surgery* 1951;30:781–786.
2. Kay JH. The treatment of cardiac arrest. An experimental study. *Surg Gyn Obstet* 1951;93:682–690.
3. Kouwenhoven WB, Milnor WR, Knickerbocker GG, Chestnut WR. Closed chest defibrillation of the heart. *Surgery* 1957;42:550–561.
4. Kouwenhoven WB, Jude JR, Knickerbocker GG. Closed chest cardiac massage. *JAMA* 1960;173:1064–1067.
5. Jude JR, Kouwenhoven WB, Knickerbocker GG. Cardiac arrest. Report of application of external cardiac massage on 118 patients. *JAMA* 1961;178:1063–1070.
6. Wilder RJ, Jude JR, Kouwenhoven WB, McMahon MC. Cardiopulmonary resuscitations by trained ambulance personnel. *JAMA* 1964;190:531–534.
7. Thomas V. *Pioneering Research in Surgical Shock and Cardiovascular Surgery.* Vivien Thomas and His Work with Alfred Blalock. Philadelphia, PA: University of Philadelphia Press, 1985.

Gastric cancer: an overview with emphasis on early gastric cancer

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ABSTRACT: *Gastric cancer has the second highest mortality rate of all cancers worldwide. More attention is now being paid to the symptoms and risk factors involved. There is also increasing use of esophagastroduodenoscopy and random biopsies in symptomatic patients, especially as a screening mechanism in Japan. As a result, lesions are being diagnosed earlier.*

Although the incidence of gastric cancer has been on the decline in the past years, the use of esophagastroduodenoscopy (EGD) and increasing awareness of the disease has shown an increase in the incidence of early gastric cancer with a lower likelihood of lymphatic involvement. This variant of the disease is controversial because it is not considered a distinct clinical pathologic entity by all. However, those who view early gastric cancer as a distinct entity consider it as having an excellent prognosis especially with adequate surgical management.

Epidemiology

Gastric cancer, second only to lung cancer, is said to account for over 500,000 deaths per year worldwide.[1,2] The disease has a marked national, gender, and age difference; some countries like Japan, Chile, Costa Rica, and South Korea have very high mortality rates.[1] In fact, from 1986 to 1988, South Korea had a ten-fold age-adjusted death rate when compared with the United States (54.6/100,000 males to 5.3/100,000).[1]

Gastric cancer predominately affects males and is seen primarily in old age, usually peaking in the sixth to seventh decades.[1] Gastric cancer type

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varies with age. Older patients tend to have an intestinal type, while patients less than 40 years of age have a more aggressive, diffuse variety.[1] Factors involving environment, diet, ethnicity, and thus genetics, influence the observed patterns of the disease. Thus, the disease rate is higher in first-generation immigrants to the United States than later generations. All studies, except those done in Japan, show a higher incidence rate in lower socioeconomic groups regardless of country of origin.[1]

Trends. Western countries, particularly the United States, have shown an unexplained but continued decline in mortality rates in both sexes over the past 50 years.[1] Many factors, including improved economic conditions (e.g., food refrigeration), are said to account for this.[1]

Type and Location. Most gastric tumors are adenocarcinomas (88%), but also include lymphomas (3%), leiomyosarcomas (1.7%), and rare lesions like carcinoids, squamous cell carcinoma, angiosarcoma, and metastasis.[3] There has been a noted decline in the incidence of the intestinal variety across all populations.[1] Along with this change comes an increase in the incidence of the disease arising in the proximal stomach (cardia).[3,4] This location tends to show predominance of the diffuse type, which is associated with being more aggressive and thus having a worse prognosis.[1]

Cause. Like most cancers, the development of gastric cancer is thought to be a multistep process, probably linked to a susceptible inherited, or even acquired, genetic component.[1] This is subject to various factors that over time alter the genetic material resulting in a cancerous growth.[1] This change can be preceded by various clinically recognizable precancerous lesions, that is, gastritis, gastric adenomas, or dysplasia.[1]

Risk Factors. Risk factors include age greater than 50, pernicious anemia, chronic atrophic gastritis, family history, smoking, and poor diet. Diets with high salt intake and the use of preserved, pickled, salted, or smoked materials are implicated.[1,4] Salt aids the development of chronic atrophic gastritis and preserved foods are usually high in nitrites and nitrates, which can be carcinogenic.[1] Infection with *Helicobacter pylori* has also been implicated as a risk factor for gastric cancer.[5-12] The infection leads to a chronic gastritis, which may advance to atrophic gastritis, intestinal metaplasia, dysplasia, then to cancer, although this is rare.[5,11] The bacterial infection increases the rate of proliferation of the gastric epithelial cells and may even decrease the gastric secretion of ascorbic acid — both processes that are said to modulate the carcinogenic process.[5,8,12] Finally, gastric acid suppression surgery has also been implicated in the development of gastric cancer. It has been noted that approximately 20 years after acid-reducing surgery, especially Billroth II, there is an increased incidence of gastric cancer in the stomach remnant.[1] This is due to the development of a "chemical" atrophic gastritis in the remnant stomach thus allowing bacterial colonization, which reduce nitrates to carcinogens.[1]

The development of gastric cancer involves a multistep process that is influenced by a number of factors including diet, environment, bacterial colonization (*H. pylori*), and genetics. Gastric cancer carries a high mortality rate worldwide that has been on the decline in the past years. However, the five-year survival rate is less than 15%.[13] Despite this, it has been noted, particularly by the Japanese, that there is a group of these patients who have an excellent prognosis. This group is said to have a form of gastric cancer termed early gastric cancer, which reportedly has a survival rate equivalent to that of healthy age-matched controls.[13]

Early gastric cancer

Definition. Early gastric cancer (EGC) is defined as a "gastric cancer that is confined to the mucosa or submucosa irrespective of regional lymph node involvement."[4,13,14] This has nothing to do with the tumor size or symptom duration, but does imply a potentially curable gastric cancer.[13] A tumor that is above the submucosa is still considered early gastric cancer even if lymph nodes are involved.[13] A recent Korean study involving 7,606 cases of gastric cancer between 1974 and 1992 found that 14.9% were early gastric cancers.[15] One Italian study showed an incidence of 15%, while another showed an incidence of 21.2%.[2,16]

The detection of early gastric cancer has formed the basis of the mass screening for gastric cancer in Japan. This has led to an increased prevalence of this type of gastric cancer in that country making up as much as 40% of the resected cases in 1985.[2,17] Although it is recognized in countries other than Japan, it may not be considered a distinct clinicopathologic entity in those countries as it is in Japan. However, as noted above, it still makes up for only a small fraction of gastric cancers, varying from 2% to 16% in North American studies.[13]

Presentation. As in other forms of gastric cancer, early gastric cancer predominately affects middle-aged men (mean age of 63).[2,15,16] Patients with this cancer usually present with symptoms resembling peptic ulcer disease including epigastric pain, dyspepsia, nausea, vomiting, anorexia, hematemesis, melena, and weight loss of less than 10 pounds.[2] These symptoms are similar but more pronounced in the presenta-

tion of advanced gastric cancer; however, the mean duration of symptoms is said to be longer for early gastric cancer than for advanced cancer.[13] Although chronic symptoms are said to be more suggestive of early gastric cancer, they will not distinguish it from advanced gastric cancer.[13]

Diagnosis. Since the definition of early gastric cancer does not include metastasis, diagnosis is usually via radiologic or endoscopic evaluation of the stomach.[18] Either method done alone provides low sensitivity with a barium meal missing on average 10% to 14% of advanced cancer. Visual inspection alone is said to correctly diagnose early gastric cancer only 50% of the time. However, if multiple directed random biopsies are added to the endoscopy, sensitivity and specificity increases may be as high as 94%.[13,16,18] Thus the use of endoscopy with biopsies is a very accurate and sensitive means of diagnosis and is particularly useful in high-risk patients.[2,16] This is especially so if it is done following radiological studies thus aiding in a more directed study.[18]

Pathological staging. Most lesions are located in the stomach's antrum or body being mostly on the lesser curvature and thus in the lower third of the stomach. However, the trend now is that the lesions are moving more proximally.[15,16] Endoscopy shows gross views of early gastric cancer which can be placed in three groups based on their contour — Type I - elevated, Type II - flat, and Type III - excavated or depressed, with the latter being the most common.[17] By definition, early gastric cancers are T1 cancers. This includes Stage 0 (TisN0M0), Stage 1A (T1N0M0), Stage 1B(T1N1M0), and some of Stage II (T1N2M0). Stage 0 involves carcinoma *in situ* or an intra-epithelial tumor without invasion of the lamina propria that has no lymph node invasion or metastasis.[13] Stage 1A also has no lymph node involvement or metastasis and has a tumor that does invade the lamina propria or the submucosa.[13] Stage 1B has a tumor that is similar to that of Stage 1A but has an N1 nodal status which involves metastasis to the perigastric nodes within 3 cm of the edge of the primary tumor with no distant metastasis.[13] Stage II involves a tumor as in Stage 1A but has an N2 lymph node status which means that there is involvement of the perigastric lymph nodes that are greater than 3 cm from the edge of the primary tumor or lymph nodes along the left gastric, common hepatic, splenic, or celiac arteries.[13]

Course. Without treatment, early gastric cancer will progress through the mucosa spreading radially and then deeper into the stomach walls.[13,17] Once the cancer has penetrated the muscularis mucosae, the chance of lymphatic spread increases: 10% of patients with early gastric cancer have lymphatic metastasis.[13,19] Another study showed 9.8% with primary (N1) nodal involvement, this being greater than for secondary (N2) nodal involvement.[16] In fact, lymph node metastasis is higher for submucosal early gastric cancer than for mucosal: 20% to 3%, respectively.[16,19] However, despite its ability to be multifocal and have lymph node involvement, this type of cancer can be curable if adequate surgery is performed.[13,20]

Nonoperative treatment. Nonoperative treatment involves chemotherapy and endoscopic techniques (i.e., laser ablation and mucosectomy), with the latter being limited to patients who are poor surgical risks.[21] The best candidates are said to be those with tumors smaller than 2 cm that appear elevated (Type 1) on endoscopy.[21]

Some studies show an excellent prognosis with five-year survival rates greater than 90%.[15] However, a 1961 study at the Mayo Clinic showed a crude survival rate of 75%, which was equivalent to age-matched controls.[15]

Surgical treatment. Survival after surgical management varies with crude five-year survival rates between 60% to 100%; however, age-adjusted survival rates usually match that of controls.[13] Subtotal gastrectomy with a 5-cm proximal and distal margin along with an extended lymphadenectomy seems adequate.[19,22,23] As mentioned above, early gastric cancer tends to be multicentric and because of this, total gastrectomy with Roux-en-Y reconstruction has been recommended by some.[13,16] This is despite studies showing low recurrence rates and extremely good patient survival at five years with subtotal gastrectomy in the United States (85%), Europe (100%), and Japan (90%).[13,16]

Currently in the United States and Italy, a subtotal gastrectomy with a 5-cm proximal margin and with limited lymphadenectomy (an R-1 resection which involves removal of the perigastric or N1 lymph nodes) is the recommended surgery and total gastrectomy is reserved for proximal or multifocal early gastric cancer.[2] In one study, subtotal gastrectomy with limited lymphadenectomy showed a five-year survival rate of 85% with a relapse in 7%.[13] European rates following subtotal gastrectomy and R-2 resection (removal of distant or N2 lymph nodes) showed a recurrence rate of 10% with a five-year age-corrected survival of up to 100%.[13]

Recurrence. Recurrence following gastric resection occurs mostly during the first five years at the anastomotic site and is usually lethal.[13,24,25] The incidence, though small, is higher for carcinomas that had involved the submucosa— 8.4% compared to 2.2% for node positive and histologically differentiated carcinomas.[13,24] These rates are higher than those seen in Japan and may be due to inadequate gastric resection and lymphadenectomy (i.e., an R-1 instead of an R-

2 lymphadenectomy) or to missed synchronous tumors, especially if the recurrence is in the gastric stump.[22,24] With regional lymph node metastasis as a significant prognostic factor, patients who are free of lymph node involvement seem to have no survival difference according to the extent of lymphadenectomy.[13] However, for those with positive lymph nodes, a radical subtotal gastrectomy with R-2 resection did show a survival benefit.[13,15,20,26] The extended R-2 resection varies with the location of the lesion being that the 16 regional (anatomic and perigastric) lymph node groups are placed in four categories (N1–N4) depending on their location and suggest the radicality of the required lymphadenectomy.[26]

Follow-up. Follow-up involves physicals every three months for the first year then annually. Endoscopy is done for five years on an annual basis or symptomatically and random biopsies are taken. Because early gastric cancer is frequently seen with synchronous and metachronous nongastric malignancies, these must be looked for on the follow-up visits.[13] One study showed second primaries in 23% of patients with early gastric cancer.[13] Another study showed death attributable to other causes in 10.9% of the patients, thus being greater than the recurrence rate of early gastric cancer.[24]

Conclusions

Despite the poor outlook regarding gastric cancer on a whole, early gastric cancer has a good survival rate which allows for successful surgical treatment. This requires early diagnosis specifically with endoscopy (traditional or with ultrasound) and random biopsies in a symptomatic patient no matter how mild the symptoms are. This is especially so if the risk factors mentioned before are present because the factors, which seem to be most important in the prognosis of the disease, namely, lymph node involvement, location, and wall depth of the lesion all tend to be mostly time dependent.[2,4,14]

Finally, surgical management with a subtotal gastrectomy for distal and middle gastric disease, and a total gastrectomy for proximal disease, seems to offer the best hope and should include a lymphadenectomy to the R-2 level.[2,16,19,22,25] This is especially so since the presence of lymph node metastasis is the most significant prognostic factor and an extended resection may not adversely affect surgical morbidity and mortality and does improve survival.[2,16,20]

References

1. Inamdor N, Levin B. The epidemiology and causes of gastric cancer. *Surg Oncol Clin North Am* 1993;2:333–345.
2. Folli S, et al. Early gastric cancer: prognostic factors in 223 patients. *Br J Surg* 1995;82:952–956.
3. Brenes F, Correa P. Pathology of gastric cancer. *Surg Oncol Clin North Am* 1993; 2:347–366.
4. Cohen M, Zoeter M, Loar C. Survival following surgical treatment of gastric cancer: a challenge for the community endoscopist. *Surg Endosc* 1994;8:862–866.
5. Correa P. *Helicobacter pylori* and gastric carcinogenesis. *Am J Surg Pathol* 1995; 19:37–43.
6. Munoz N. Gastric cancer and *Helicobacter pylori*. *Eur J Cancer Prev* 1996;5:405–408.
7. De Koster E, et al. *Helicobacter pylori*: the link with gastric cancer. *Eur J Cancer Prev* 1994;3:247–257.
8. Lynch DA, Axon AT. *Helicobacter pylori*, gastric cancer and gastric epithelial kinetics: a review. *Eur J Gastroenterol Hepatol* 1995;751:17–23.
9. Moayyedi P, Dixon WF. Significance of *Helicobacter pylori* infection and gastric cancer: implications for screening. *Gastrointest Endosc Clin North Am* 1997;1:47–64.
10. Goldstone AR, et al. *Helicobacter pylori* infection and gastric cancer. *J Pathol* 1996; 1792:129–137.
11. Kuipers EJ, Meuwissen SG. *Helicobacter pylori* and gastric carcinogenesis. *Scand J Gastroenterol* 1996;218:103–105.
12. Forman D. *Helicobacter pylori* and gastric cancer. *Scand J Gastroenterol* 1996; 220:23–26.
13. Farley D, Donohue J. Early gastric cancer. *Surg Clin North Am* 1992;72: 401–421.
14. Moreax J, Bougaran J. Early gastric cancer: a 25-year surgical experience. *Ann Surg* 1993;217:347–355.
15. Kim J, et al. Lymph node metastasis as a significant factor in early gastric cancer : analysis of 1136 early gastric cancers. *Ann Surg Oncol* 1995;2:308–313.
16. Pinto E, et al. Early gastric cancer: report on 142 patients observed over 13 years. *Jpn J Clin Oncol* 1994;24:12–19.
17. Shimizu S, et al. Early gastric cancer: its surveillance and natural course. *Endoscopy* 1995;27:27–31.
18. Nava H, Arrendondo M. Diagnosis of gastric cancer: endoscopy, imaging, and tumor markers. *Surg Oncol Clin North Am* 1993;3:371–392.
19. Hayes N, et al. Radical lymphadenectomy in the management of early gastric cancer. *Br J Surg* 1996;83:1421–1423.
20. Arak A, Kull K. Factors influencing survival of patients after radical surgery for gastric cancer: a regional study of 406 patients over a 10-year period. *Acta Oncol* 1994;33:913–920.
21. Hiki Y, et al. Minimally invasive surgery: endoscopic treatment of gastric cancer. *Surg Oncol Clin North Am* 1993;2:483–491.
22. Guadayni S, et al. Causes of death and recurrence after surgery for early gastric cancer. *World J Surg* 1997;21:434–439.
23. Heesakkers JPFA, et al. Non-radical therapy for early gastric cancer. *Br J Surg* 1994;81:551–553.
24. Sano T, et al. Recurrence of early gastric cancer: follow-up of 1475 patients and review of the Japanese literature. *Cancer* 1993;72:3174–3178.
25. Douglass, H. R-2 dissection in the treatment of gastric malignancy. *Surg Oncol Clin North Am* 1993;2:413–429.
26. Shriver C, Karpeh M, Brennan M. Extended lymph node dissection in gastric cancer. *Surg Oncol Clin North Am* 1993; 2:393–411. ■

View POINTS

EDITOR'S NOTE: Last October I attended the "Doctor's Health Care 2000 Conference" held in Baltimore. I was impressed with the information presented by some of those aspiring to political office in Maryland, and felt that it would be worthwhile to provide a forum for their views to be expressed to Maryland's physicians. In January, we invited the four official candidates for the office of governor, two from each party, to submit an article about their views on medical care. The journal is a nonpartisan publication; all those who responded are being published in alphabetical order in this special section.

Today's Health Care Environment

CHUCK ECKER
Republican Candidate for Governor

Today's health care environment must certainly make physicians feel as if they are under attack. In fact, many physicians have come to believe that medicine is no longer a profession, but an industry. The politics and practices of many managed care companies and other health care related companies seem to threaten a physician's ability to provide high-quality care to the patients they have dedicated their lives to serving. More than ever, I believe the physician community must band together and pursue a focused, coherent agenda in the policy-making arena to ensure that the health care of Americans is protected and promoted.

Managed care focuses primarily on cost-effective health care. As the physician, your job is to balance this fiscal goal against your fundamental responsibility of meeting the needs of your patients. All too often this goal and your primary responsibility are at odds. The Norwood legislation on Capitol Hill (HB 1415) seems to provide greater safeguards to patients by imposing requirements on managed care companies in areas such as accountability, access to care, and quality measures. Although this piece of legislation is generally encouraging, I cannot endorse its provision that imposes salary equivalency standards on the nonphysician community. Regardless, federal efforts in this area appear to be unlikely in the near future.

On the state level, I am particularly pleased by the actions taken by the Maryland legislature this year. New legislation (HB 3/SB 431) creates a mechanism for external review of adverse decisions regarding care denials and reimbursement by the Maryland Insurance Commission. Retroactive decision making by HMOs, in terms of care delivery and payment, is a major problem for physicians as well as patients in Maryland. I am hopeful that this new legislation will serve as an important first step in pressing for greater accountability among managed care companies.

While these and most legislative efforts focus on a physician's role in terms of patient diagnosis and treatment, it is imperative that a physician's other, and equally important duty, is not forgotten. A physician is responsible for advocating the promotion of good health and preventive services. New ways must be found for physicians to share information so as to compare therapeutics and to promote healthful behavior in general. Although the interchange of electronic data can contribute greatly to physician knowledge about helpful practices, patient confidentiality must be protected at all costs.

In terms of preventive care, it is encouraging that the new federal and state Children's Health Insurance Program will provide health services to uninsured children, but more should be done to promote immunization. Immunization is the first line of defense in preventive medicine. Additionally, while the public had been greatly enlightened over the last number of years about the health consequences of breast cancer and smoking, more public attention needs to be focused on other problem diseases such as diabetes, skin cancer, and hypertension.

Although the physician community is embroiled in major public health policy issues, I cannot forget that physicians have the responsibility for operating their own businesses. Retroactive payments and denials have a profoundly negative impact on a physician's ability to operate a business. I believe that these issues can be addressed on the state level. Unfortunately, some other important issues can only be addressed on the federal level — the battles over practice expense and evaluation and documentation guidelines.

The role of the physician in today's health care environment is more important than ever. The American public relies on physicians to protect and main-

tain the integrity of the health care system. I certainly understand the quandary that physicians face on a daily basis — your principal charge is to provide the highest quality of care to the patients you serve. Yet you are caught in a payment system that undermines this goal.

The constant battle undoubtedly leaves you feeling frustrated and discouraged. But in the end, I believe your views will prevail. Your views will prevail because most people recognize that your fundamental goal is not to make excessive amounts of money, but to maintain the integrity of the physician and patient relationship — to provide the highest level of care for each patient. Physicians still rank among the most highly respected professionals in America. Because you are trusted and respected by the American people, your voice will be heard. ◆

Toward a Healthier Health Care Delivery System

EILEEN REHRMANN
Harford County Executive and Democratic Candidate for Governor

The delivery of quality, accessible, and affordable health care to the citizens of Maryland is one of the most important concerns facing this state as we approach a new century. No single issue can have a greater impact on our daily lives.

During these rapidly changing times, our citizens have become increasingly frustrated with the ability of the health care industry to deliver the medical services they believe are necessary to maintain their quality of life. The state's health care system is undergoing significant change, and many citizens worry that these changes reduce their health options and lower their quality of care.

As we approach a new century, the delivery of quality, accessible, affordable health care to citizens emerges as one of the most important concerns facing Marylanders.

The growth of health maintenance organizations (HMOs) and other managed care programs has changed dramatically the way patients, physicians, health care industry, and government relate to each other. There is much criticism that medical care decisions are being driven by concern about holding down costs at the expense of quality health care.

It is frustrating for us all—patients, physicians, health care administrators, and government—as we watch our health care delivery system work through its growing pains, struggling to provide quality health care while addressing costs.

As I traveled around the state, time and again citizens shared with me personal stories that highlight the growing problems with quality and costs.

Let me share with you the story of a 35-year-old mother who has multiple sclerosis (MS) and a $1,000-a-month medication bill. When her HMO was taken over by another, she first learned of the change when she received a 30-day notice from the new provider that her medical coverage was being switched to a prescription plan that allows only $1,000 per year for medication. She appealed the decision to the HMO but the appeal was denied. Having no other appeal recourse at the time, she pleaded with the HMO once again and received the preposterous advice to divorce her husband and obtain a separate residence so that she could qualify for Medicaid. This is not an acceptable medical solution.

I wish this story was made up but it is not. It happened to a real person, a once physically vital young woman who worked as an intensive care nurse in Maryland hospitals and discovered five years ago that she had MS. The experience she had with her HMO has a frighteningly familiar ring for a growing number of patients around the state.

Some patients tell how they were required to pay for emergency room treatment for sudden illnesses, such as a heart attack, because they failed to get prior approval. A 36-year-old patient with lupus was told to wash out and reuse her colostomy bag because her health maintenance plan would pay for only one osteo bag every five days. Something is terribly wrong with this picture and I don't believe that anyone wants it embedded as a standard operating procedure.

And if patients are sensing a lack of concern for their well-being within their HMOs and managed care organizations (MCOs), physicians too are feeling a squeeze. They feel that they are practicing medicine in a glass cage, with their treatment plans microman-

aged and compromised by others not directly involved in administering care to the patient. I don't believe that anyone really wants that.

We all feel that there should be no compromising when it comes to patient care. But many physicians' medical decisions are weakened by what some MCOs will and will not pay for. Meanwhile, the telephone traffic between the physician's office and the malpractice insurer escalates as physicians try to protect themselves from choices they are forced to make by reimbursement rules geared toward holding down costs.

Consider the dilemma of the physician who has diagnosed a patient with bronchitis, for example. The plan agrees to pay for the treatment for bronchitis. But this patient also has diabetes which calls for a different, more expensive medical approach to the bronchitis treatment. The HMO disallows the physician's treatment plan, seemingly without consideration for the medical need to customize the care for the treatment of bronchitis in the presence of diabetes.

Knowing that following the plan's guidelines would be anti-ethical to good medical practice and fearing that following them exposes him to a charge of malpractice, the physician calls his malpractice insurer. The insurer concludes that to follow the directive would be overt malpractice. The physician so advises the plan but yet the plan refuses to capitulate. What does a physician do then?

It is dangerous when physicians are fearful of recommending courses of action for their patients because they could be sued for malpractice or fired by the HMO for not following its directives. A reward system for less expensive care is an undue influence that is neither in the best interest of the patient nor of the physician.

The irony is that the managed care concept is a good one. There are successful examples. However, for a growing number of these organizations the profit is not in how many people use their services but how many do not. Retroactive denials seem to make HMOs more profit than all of their other products.

In all of the examples of system failure that I shared above, the patient could appeal the decisions but the process is a long, complicated, and discouraging one that starts internally within the HMO and until recently, ended there. When it comes to appeals, risk management at these organizations favor playing the percentages and the percentages say that most people will give up their appeals in frustration.

Michael Campbell, a lawyer with the Pennsylvania Health Law Project, told *Newsweek* magazine, "There are incredible financial incentives to underserve members."

If it is practiced correctly, managed care can succeed. Our challenge is to have a health care delivery system that provides quality standards of care in a professional, responsive, responsible, and efficient manner.

To meet this core principal, I propose adoption of a Bill of Rights for HMO members, which would set standards of care for access to health care, address concerns for the dignity and respect of patients, provide for privacy and confidentiality, provide financial information, and set standards for communications and the grievance process.

There must be standards of accountability for MCOs. The medical director of these organizations must abide by the same standards of accountability as physicians, such as being subjected to the authority of the Board of Physician Quality Assurance.

One of the complaints I hear from MCOs is they must negotiate their way through a web of regulations. I propose regulatory reform that streamlines, integrates, and consolidates health care regulatory responsibilities under a single regulatory commission.

With so many programs and so many organizations involved in heath care, our citizens need to be better informed in how to deal with it. I propose the establishment of a Citizens Assistance Program that would provide education to participants in managed care and act as an advocate for those having problems navigating the managed care system.

We must all work together so that the best health care is available to the citizens of Maryland at the most reasonable cost. This is no easy challenge in this rapidly changing environment. We have the resources, the brain power, and the capability to make this happen. We must also have the commitment to make it happen.

As Governor of Maryland, I have the commitment to achieve this vision. ◆

The Future of Maryland Health Care

ELLEN SAUERBREY
Former Minority Leader of the House of Delegates and a Republican Candidate for Governor

Over the past several years, Maryland health care has changed dramatically. On the one hand, we have witnessed the rise of managed care. On the other hand, we have witnessed a rise in the number of uninsured. The number of nonelderly uninsured has actually been increasing in Maryland since 1989, when it stood at 11%. Now it stands at 17.3%.

To a certain extent, these movements flow from a common source. Tax laws provide generous tax relief for health insurance only on one condition – that insurance is obtained through the workplace. The federal tax credit, which is by far the most valuable, is received only when employees purchase health insurance through their employers, not as independent consumers.

It is this defect in the federal tax code that is driving the growth of managed care. The employer chooses and owns the employee's plan and because employers are primarily concerned with cost, they opt for the cheapest plan, which is generally a health maintenance organization (HMO). In this way, insurance companies work for employers, not consumers; the consumer is left with little or no choice in regard to plans.

The result is that families lose control over their benefits. Auto insurance, life insurance, homeowner's insurance – the consumer owns these policies. When people change jobs, they keep these forms of coverage. But the same action puts them at risk for losing their most important coverage – health insurance.

The same bias in the federal tax code is causing the number of uninsured in Maryland to increase. It is prohibitively expensive for most people to purchase health insurance with after-tax dollars. Yet, this is what they are being asked to do if they are part-time employees or working for a small business that does not offer health insurance. The problem is made worse by the fact that individuals are dwarfed in power by insurance concerns who represent large groups of employers and who, by virtue of their size, can negotiate the best deals with hospitals and physicians. For individual consumers, this further raises the cost of health care as the real cost is shifted back to them.

Federal tax policy also contributes to rising medical costs. Because health insurance is paid for by the employer, there is no incentive for the employee to question medical costs or control consumption. If employees try to effect savings by cutting down on the utilization of routine services, they cannot pocket the savings. The savings simply go to their company.

In sum, federal tax policy has created an employer-based insurance system that isolates and insulates individuals from the cost of their health care. Its emphasis on employer-based plans has caused a move away from traditional indemnity insurance and toward managed care. Its focus on the workplace has prevented families from purchasing routine medical care directly out-of-pocket, or buying insurance outside of the workplace, even when such options are more cost-effective. Its penchant for rewarding consumption and discouraging personal responsibility has resulted in soaring medical costs.

Snapshot of Maryland health care today

Across the state, the anxiety level is tremendous.

Consumers who do not have health insurance live in constant fear of getting sick. Consumers who do have health insurance live in constant fear of losing it or not being able to pay for it.

Consumers enrolled in HMOs resent the fact that managed care seems more to be "managed cost" and that the savings in managed care have come about through restrictions on care. While some HMOs have tried to ease medical inflation through aggressive preventive health and wellness programs, we now see that one of the major ways the HMOs control costs is by denying services or decreasing reimbursement. These service denials are unpopular with the public and in Annapolis. The result is a legislature that now spends much of its time trying to micromanage the operations of HMOs.

Physicians are also nervous and confused. Under managed care, they believe their medical judgment is being overridden by business concerns and that the practice of medicine must now conform to some unscientific measure of profit and loss. The rules of insurance are so complicated and time consuming that it is becoming increasingly difficult for physicians to do what they do best – practice medicine.

The picture in Maryland is one of increasing numbers of uninsured, too many gaps in coverage, benefit packages in rapid transition, growing numbers of people unhappy that they have lost control over their health care decisions, a disjointed financing mechanism, excessive regulation, and physicians and hospitals unsure of what is coming next.

But in this crisis, I see opportunity – an opportunity to make our health care system more efficient, to increase access, to improve care and to lower cost. I have every confidence that we can succeed in this task if we are guided by certain fundamental principles.

First, decisions made between physician and patient are better than decisions made in Annapolis or Washington, or by one's employer or insurance company. Medical students learn from day one the rule: First, do no harm. In politics, that rule is too often forgotten. The role of government should not be to micromanage medicine, but to make it possible for Marylanders to choose the health care plan that best meets their needs.

Community Health Networks (CHNs) hold out the hope that quality of care will be controlled by physicians rather than insurers and utilization review panels.

They may also provide greater continuity of care than HMOs (which see people changing companies on average every fourteen months). These organizations, which represent collaborative efforts on the part of hospitals and physicians to present a plan directly to employers, are hindered in Maryland because they are not legally considered risk-bearing entities. On the federal level, Congress has authorized similar organizations to come into being to compete for Medicare-risk contracts. If the way is cleared for CHNs to enter the commercial market in Maryland, they should have the same solvency and consumer protection requirements as insurance companies. Competition is essential to the marketplace, but so is a level playing field.

Second, health care reform that takes medical decisions away from physicians and gives them to bureaucrats is not reform – it is disaster in the making. In Maryland, we are already beginning to see this disaster taking shape in the form of proposed fee schedules and practice guidelines legislated by statute.

Conventional health policy is rooted in notions of government control, and this is why its record is spotty and inefficient. Government controls only work for a relatively short period of time because physicians, hospitals and other independent professionals will educate themselves on ways to beat the system within all legal means available. This then requires more controls, which lead to greater costs of compliance (paper work) and delays in care (red tape).

Third, most of the reform efforts today are aimed at curing the symptoms of the health care crisis without recognizing or dealing with the basic cause. The real solution is reform of the tax system and informed personal choice. A greater reliance on personal responsibility would also yield tremendously positive results – lower costs, more discerning consumers, and an overall improvement in the quality of the system.

Medical savings accounts (MSAs) serve as an excellent example of how the reform effort should proceed. Last year, the federal government began a pilot program in which small business employees and the self-employed could purchase tax-advantaged MSAs. MSAs combine a high-deductible insurance policy with a savings account that is used by the consumer to pay for routine medical expenses. The funds left over at the end of the year are kept by the individual and are tax-deferred.

MSAs empower consumers by restoring freedom of choice. Through them, consumers can pick their physician or see a specialist without having to ask permission from a gatekeeper. Direct payment for routine medical care has the additional benefit of reducing paper work and administrative costs. And MSAs give families an incentive to spend wisely and to benefit from the money they save by doing so.

This is what we need to do: *Improve access to affordable health insurance.*

The small group market

The current administration in Annapolis has attached requirements to MSAs, over and above the federal requirements, making them too expensive for young families or people with low incomes. This is both unfair and bad policy. It is unfair to prevent people from buying an insurance policy simply because that policy is not a deluxe plan. The result is that young and low-income people are condemned to having no insurance at all. We need to change this immediately by using the federal legislation that created MSAs as our source of regulation and eliminating the additional requirements.

At the same time, we need to educate the citizens of Maryland about MSAs. Anecdotal evidence suggests that many people in Maryland (both physicians and consumers) are unfamiliar with the

concept of MSAs. This situation needs to be corrected. MSAs are an important reform vehicle, and the people of Maryland need to know about them.

Large group and individual markets

Much of the high expense of insurance in these two markets is due to the large number of state-mandated benefits that plans are required to offer. In Maryland, there are close to fifty mandated benefits, putting the state way above the national average. Last year, the General Accounting Office estimated that they add 22% to the cost of premiums.

These benefits are popular and well meaning, but they raise the cost of health insurance by requiring every plan to be a Cadillac. By not allowing more affordable, bare-bones coverage, they force some businesses to offer nothing at all to their employees and make individual coverage equally difficult to purchase. On the other end of the spectrum, many large businesses self-insure in response to the increase in premiums, thereby evading the mandates altogether.

We must establish an independent academic review process to look at those mandates already on the books as well as the new ones suggested by the legislature. A panel charged with this duty was created by statute during this year's legislative session. But during that same session, at least four new mandated benefits were passed into law. Thus, the existence of a panel is not, in itself, enough to solve the problem. It also requires leadership and determination. We need to thoughtfully and carefully review both past and future mandates and evaluate their real impact on the health of the populace. In the individual market, we should make MSAs state tax deductible for those individuals not eligible to participate in the federal pilot program. Insurance for people in this market does not qualify for the federal tax deduction, which makes it incredibly expensive. The state tax deduction is not as valuable as the federal deduction, but it would definitely help.

Children's health insurance

For the past year, in speeches and written editorials, I have argued that the best way to use the new federal money earmarked for children's health insurance is to create a public-private partnership rather than simply expand Medicaid. By relying on commercial insurance, which is less expensive than Medicaid, we can insure more children, save the taxpayers money, offer parents more choice of plans, and avoid the tremendous financial risk that follows the creation of a new entitlement program.

Governor Glendening supported an enormous expansion of Medicaid. But many Democrats in this year's legislative session harbored the same concerns toward his big government solution as Republicans. What resulted was a compromise bill that will allow parents between 185% and 200% of the federal poverty level to purchase commercial plans and not simply be pushed into Medicaid. The passage of this bill demonstrates how Democrats and Republicans, working together, can produce a moderate, sensible solution to public policy concerns.

But there is still work to be done. Because the standard benefit plan in Maryland's small group market does not satisfy the federal requirements for children's health insurance under the federal law creating the program, the state will have to apply for a waiver from the Health Care Finance Administration to allow the standard benefit plan to be used. Without the waiver, the only option for parents working in small business will be to put their children in a Medicaid plan; they will not be able to simply add them to their insurance policies. Unless we have an executive who pushes the waiver process forward, who prepares the administrative apparatus for the private sector alternative once the waiver clears and who makes the public aware of this alternative, the new insurance program, for all practical purposes, simply expands Medicaid. All the concerns that Democrats and Republicans had about the Governor's original plan – that it creates a new expensive entitlement, that it causes people with equal incomes to be treated differently and that it forces consumers into a state HMO – will remain operative.

Educate consumers about the differences between plans

Consumers (both employers and employees) need to be better educated about the differences between health plans so that they can make informed decisions. This is important because it is through consumer pressure, not through government legislation, that services improve. Physicians, hospitals, and managed care organizations (MCOs) will have incentives to give the highest quality care, even though it may cost a bit more, if the consumer is made aware of differences between plans (and is given an opportunity to have his or her voice heard). This is

especially important for self-insured plans, which are organized under the federal ERISA law and are beyond the reach of state regulators. These plans are said to comprise about 40% of the Maryland insurance market and they can only be influenced by consumers, armed with knowledge, who complain to their employers.

One important way to educate consumers is to build on the HMO report card that was recently released by the HCACC (Health Care Access and Cost Commission). The HMO report card can be made more effective by:

- Including a survey of consumer satisfaction in which the sick, not just the general population, rate the various health plans. The sick use the system more often; they are better judges of it.
- Including a survey of consumer satisfaction that assesses not just the medical quality but how smoothly the insurance side of the plan runs. How easy is it to get bills paid? How many complaints are registered with the Insurance Commission for a particular plan? These are questions that employers and employees need to have answered.
- Including a survey of managed care from the perspective of physicians.
- Including an explanation of how much of the consumer's premium goes to actual medical care as opposed to administration.
- Moving toward the collection of outcomes data. Much of what the current HMO report card measures is quality of process. But quality of process (e.g. chart review, record keeping) is less important than quality of outcome – morbidity, mortality and complications.
- Including a measure of disenrollment rates according to age and diagnosis. Older and sicker patients need to know what the level of dissatisfaction has been among those customers of an HMO who most often use its services.

Protect the consumer's right to privacy

The issue of patient privacy exists in both the public and private sectors.

In the public sector, HCACC is now collecting outpatient medical data without patient consent. This is totally inappropriate. Given the recent advances in computer hacker technology, given that medical inflation has slowed over the last few years without these data, given that patients will avoid care for highly stigmatized conditions because they fear exposure, and given that no other state has felt compelled to proceed in this fashion, the collection of outpatient medical data without consent should cease immediately.

In the private sector, medical information is often shared through computer links. Government should work with managed care companies to ensure the privacy of these data. The industry should welcome the state's help in making these data more secure.

We must also protect the privacy of physicians. There has been some discussion about making physician profiles available on the Internet. It is important that consumers have as much information as possible about the delivery of their health care. At the same time, we live in a litigious society and some people look at malpractice suits as a kind of lottery. For this reason, nuisance suits are occasionally brought against excellent physicians and it would be unfair to drag a good physician's reputation through the mud by advertising pending suits as if all were equivalent. Pending law suits do not belong in a physician profile.

Improve relations between physicians and the managed care industry

At present, there is considerable distrust between the managed care industry and physicians. It is because of this distrust, and the lack of any working relationship between the two groups, that government is so often being asked to step in and regulate the health care industry.

To a certain extent, the role of Governor is to act as a facilitator, to encourage a dialogue between these two sectors of the market. This is important, for as long as the discord continues, Maryland health care will only suffer.

A good place to start would be to start calling physicians "physicians" and not just "providers." The latter is dehumanizing; it makes physicians feel like cogs in a machine and does not recognize the years of hard work, training, and dedication that went into becoming a physician. Physicians resent the label "provider" and, frankly, I don't blame them.

But there is more that we can do. We need to create a permanent nonprofit institution where MCOs and health care professionals can come together and resolve important issues. Currently, there is no institution on neutral ground where physicians and managed care executives come together for this purpose. The goal should be to create such a body (e.g., Med Chi) where issues like treatment protocols, practice parameters, length of hospital stays, and continuity of care

can be addressed by people with the necessary expertise. While such an institution would have a government contact point, it would not be government-dominated. This would prevent intervention and micromanagement of medical care issues by bureaucrats.

Finally, we need to introduce and pass a "physician appeals and grievance bill." No such legislation has been introduced in Maryland but six other states have such laws. Basically, the legislation would require an HMO to give the physician a reason for why he or she was removed from its panel of physicians (deselected). It would also require a review board, which would include at least two physicians from the same specialty as the physician being reviewed, to evaluate the decision if the physician decided to appeal. It takes many months, even years, for some patients to find a physician with whom they are comfortable. Breaking up that physician-patient relationship is a serious matter and the process of deselection should not simply be driven by economics.

Streamline the state regulatory agencies

In 1994, the current administration was approached by many in the business community to obtain help in easing the regulatory burden on health care. Nothing was done and, to date, nothing has been done. I believe there are three regulatory agencies at the state level whose functions need to be closely scrutinized and, in some cases, curtailed.

HRPC (Health Resources Planning Commission)

The HRPC was originally designed to project the health care needs of the state and to administer the certificate of need (CON) program. The result has been market distortions and impediments to sound business practice.

For example, there is tremendous hospital capacity in Maryland. Hospitals spent nearly $900 million over the last few years to expand and renovate facilities. Yet, while the average occupancy rate in 1982 when the CON program was started was 82%, in 1996 it was 56%. In one hospital it was only 19%. It is hard to believe the argument that these empty beds do not cost anything because they are not staffed. These underutilized hospitals have heating bills and other fixed costs, as well as duplicate administrators.

Moreover, in the effort to merge or close facilities to gain efficiency, hospitals must spend thousands of dollars to get permission from the HRPC. This was the case in some of the planned hospital mergers in Western Maryland and on the Eastern Shore.

The regulatory functions of the HRPC should be seriously curtailed, with its public health planning functions transferred directly to the Department of Health. Medical procedures where volume and quality are directly related, such as cardiac surgery and organ transplants, should remain covered by the CON. But the rest of the CON program should be seriously reduced.

HCACC (Health Care Access and Cost Commission)

HCACC was created in 1993 when it was thought that big government was needed to reform the health care system and control costs. One of the main purposes of HCACC was to establish a fee schedule for physicians.

A fee schedule is nothing short of wage and price controls. This country learned an important lesson in the 1970s, that price controls do not work and do not control costs. They merely shift costs or produce shortages in goods and services. In Maryland, the idea of using price controls in the health care system is especially anachronistic. Over the last few years, the market has shown that, through competition and greater efficiency, medical cost inflation can be brought under control. Concerns about overpayment of physicians are barely relevant now.

The legislature should vote to remove this purpose of HCACC from the original statute that created the commission. The current administration has had three years to move on this but has not. HCACC's other functions – the HMO report card and determining the standard benefits plan for the small group market – are valuable, but they may not require a large, independent commission to be carried out.

HSCRC (Health Services and Cost Review Commission)

The HSCRC has been in existence since 1974 as part of a hospital rate-setting system that is unique. Few states embarked on such a project and only Maryland retains it. For many years, Maryland's hospital rate-setting system was very effective and flexible and it served its purpose well, including stabilizing hospital costs. Now, however, as hospital costs in Maryland began to rise again above the national average, as more and more surgeries are performed

on an outpatient basis (which the HSCRC was never designed to handle) and as more hospitals function with low occupancy rates, the time has come to discuss whether Maryland might benefit from a shrinking of this part of the regulatory apparatus. As Governor, I would immediately appoint a blue-ribbon panel to examine this issue.

The consequences of changing this part of the regulatory system are enormous and many questions need to be answered. Under a less regulated system, how will hospitals be reimbursed for uncompensated care? How will residency training programs in teaching hospitals be subsidized? How will we make sure that one hospital serving a large rural area does not simply disappear? What are the effects on employment if a number of hospitals in a single area close and what happens to the outstanding loans that serviced much of the recent wave of hospital construction?

The issue of deregulation is deserving of the utmost respect. During the interim, the HSCRC should become more flexible – for example, in permitting hospitals (some of which have national reputations) to deliver care in an outpatient setting in ways that allow them to compete fairly with unregulated, freestanding centers. But on the larger issue of decreased hospital regulation, we must proceed thoughtfully and carefully.

In sum, I am recommending an activist approach to the problem of health care, but one that is in the tradition of Theodore Roosevelt and the Progressive Era, not Great Society big government. The point should not be to micromanage businesses and physicians but, instead, to foster healthy competition so that in the end value and cost are effectively matched. This requires greater consumer input than what is currently found in the system and, to a degree, some government action. At the same time, in order for Maryland's private health care system to thrive, certain governmental controls need to be relaxed and a greater reliance must be placed on regulatory bodies found within the private sector, including hospital associations and professional organizations.

This last point is very important because legislators in state government must not be given responsibility for patient care. They do not have the expertise. Perhaps worse, giving them such power politicizes medical decision making. It takes medical decisions out of the calm, scientific arena where they are best made. Instead, what we need is tax reform, greater access, more consumer education, and a system that rewards the highest quality of care, not the cheapest. This is how the citizens of Maryland will be made to feel less anxious about the future of their health care system and how we can make Maryland health care the best in the nation. ◆

What Your Patients MAY BE READING

- **Natural headache cures**
  Yes, we feel your pain. Here, five new alternative treatments to conquer it.

Mademoiselle, August 1998
Author discusses biofeedback, visualization, stretching, acupressure, and herbs.

- **Singing the HMO Blues**
  Take five years of busy signals, surly nurses and hospital horror stories, add a dash of Viagra sex appeal, and you have the making of a managed care revolt.

Time, July 13, 1998

- **The "Other" Ovarian Danger**
  Up to one in ten women has a potentially life-threatening ovarian disorder, yet most don't know it. Here, tell tale symptoms – and the latest treatments.

Good Housekeeping, August 1998
Article is a first person story from a women with polycystic ovarian syndrome (PCOS), which went undiagnosed for many years.

- **Science in the Sack: Beyond Viagra**
  The next sexual revolution will start in the brain.

Men's Journal, August 1998
Article lists medical treatments available for impotence as well as treatments soon to be available. Also provides timeline of impotence treatments and philosophies.

- **Aspirin without Ulcers**
  A new category of drugs could soon relieve pain and inflammation without raving your stomach.

Time, July 13, 1998
Reviews this new category of drugs and updates consumers on the stage of developments by various pharmaceutical companies.

- **Vaccination Roulette**

Healthy & Natural, August 1998
This article tells horror stories of both scenarios – children who receive vaccines and die or are disabled as a result and children who fail to receive vaccines and die from exposure to disease. A history of vaccination and suggested alternatives are provided.

- **Too Embarrassed to Ask?**
  The health questions that make you blush may be the most important ones. Here, what you really want to know from your doctor.

Ladies Home Journal, August 1998
Questions are geared towards females and cover discharge, vaginal odor, incontinence, herpes, constipation, and gas.

George Herschel Yeager, M.D.

—October 19, 1905 – January 4, 1998—

Dedicated surgeon and professor, scholar, able and innovative administrator, distinguished wartime medical officer and tireless public servant, from the department of medicine, University of Maryland School of Medicine and Hospital and the Baltimore Veterans Administration Medical Center

Dr. Yeager, our honored colleague, enjoyed a distinguished career as a surgeon, medical administrator, member, and officer of many local and national surgical societies, and in the military.

George Yeager was born in Davis, West Virginia, on October 19, 1905. He received his Bachelor of Science degree from the University of West Virginia in 1925, and his Doctor of Medicine degree from the University of Maryland School of Medicine in 1929. He completed the surgical residency program at the University Hospital in 1933 under Professor Arthur M. Shipley, and he was continuously associated with the university. During the period from 1933 to 1942, Dr. Yeager was active in anesthesiology, working and teaching in operative surgery, engaging in a busy surgical practice, and developing a clinic for the treatment of peripheral vascular disease. During these years he also found time to serve as an enthusiastic member of the Maryland National Guard.

In 1942, Dr. Yeager departed for overseas as Chief Surgeon of the 42nd General Hospital. A year later he became its commanding officer. This unit served with distinction in Australia, the Philippines, and Japan. This position brought to the forefront his outstanding capabilities as an administrator, for which he was awarded the Legion of Merit in 1945 by General Douglas MacArthur. Following are excerpts from General MacArthur's commendation to the hospital unit:

> I desire to make of record my grateful appreciation for the splendid services your officers, nurses and enlisted men have rendered in the campaigns which culminated in the liberation of the Philippines and the occupation of Japan.
>
> Through that long bitter period from May 1942 when your hospital unit arrived in Australia, until peace was restored upon the surrender of Japan, it has proved a tower of strength in ministering to the sick and wounded of our military forces committed in the South West Pacific area and thereby has upheld the highest traditions of the American Army and the medical and nursing professions as well.

Reprints: Theodore E. Woodward, M.D., Professor of Medicine Emeritus, 22 S. Greene St., Box 182, Baltimore, MD 21201

George H. Yeager, M.D., at the time of his citation as the 1975 Maryland Alumni Gold Key awardee.

After discharge from active duty in April 1945, his interest in the military continued as a reserve officer and as a consultant to the Surgeon General, Air Force. In 1970, he retired from the service as a Brigadier General, USAF.

From 1945, Dr. Yeager displayed a most unusual capacity for stamina and hard work. He was very busy with a demanding surgical practice and also found time to be active in local, state, and national societies. He served as president of the state medical society (1955 to 1956), and was a founding member of the *Maryland Medical Journal*, serving as its senior editor from 1952 to 1966. He was a member of the American Board of Surgery (diplomate, 1940), the American Surgical Association, Southern Surgical Association (secretary and past president), the Society for Vascular Surgery (secretary and past president), the Southern Medical Association (past counselor), the Southern Surgeons Club (past president), the Maryland State Board of Physical Therapy, the Southeastern Surgical Congress (past president), and the New York Academy of Science.

In his delightful 1969 presidential address to the Southern Surgical Association, Dr. Yeager interestingly described the early development of medical schools in America. He proudly included his alma matter, the University of Maryland School of Medicine. Founded in 1807, it was the first medical school below the Mason-Dixon line. From the partial list of organizations to which he belonged, it was apparent from the number of elected positions in these societies that his capabilities as an administrator and leader were duly recognized. During this span of years he also served on 16 local, state, and national planning and review committees. He was active in the research surgical laboratory at the University of Maryland, and for some years was its director. From this area came many of the 71 published papers of which he was author or co-author.

Dr. George Yeager, director, at his desk, University of Maryland Hospital, 1971.

One of Dr. Yeager's early publications, with colleagues, described the experimental production of canine peritonitis, and successful treatment with the broad-spectrum antibiotics chloramphenicol and tetracycline. Clinical treatment of patients with peritonitis soon followed.

There is no question that his careful direction and strong administrative support at high professional levels were instrumental in ensuring success of the unique Shock Trauma Center, the first such imaginative emergency health structure in America. Undoubtedly his World War II experiences in the Southwest Pacific theatre, his wealth of professional health contacts, and his sense of teamwork all contributed immeasurably to the center's success under Dr. Cowley's directorship.

With his recognized and proven administrative ability, it seemed very natural that in February 1965 he was requested to assume the duties of director of the University of Maryland Hospital. Immediately after assuming this post, there was a very noticeable improvement in morale. Many impor-

tant changes were accomplished. The old and overcrowded building was rejuvenated: new units were added and the old areas refurbished. His tenure was characterized by steady and outstanding progress, often accomplished under almost insurmountable administrative difficulties.

Dr. Yeager was a personable, capable, compassionate, generous, tolerant, and industrious individual; a man admired and respected by people in all walks of life. In addition to those many attributes which led to his successful and productive career, he was endowed with great equanimity. Without this, such a task as director of the University of Maryland Hospital would have been well nigh impossible. As his directorship ended, it was the unanimous opinion that "George Yeager had done a great and outstanding job."

In a 1973 *Baltimore Sun* interview he commented, "Administration is not as tiring or demanding as surgery, but it's more frustrating. You are dealing with intangibles, having to equate the needs of one individual against the needs of another, always putting the needs of the patient first."

On his retirement from directorship of the University of Maryland Hospital a testimonial dinner was held in Dr. and Mrs. Yeager's honor. It was attended by many professional and civic friends and colleagues (see photographs). A traditional chair and sterling platter were presented to him, suitably inscribed:

(From left) Dr. and Mrs. George Yeager, Dr. and Mrs. Wilson Elkins.

George H. Yeager, M.D.
From his friends and associates
in commemoration of his
eight years as Director of the
University of Maryland Hospital
and his eminent career as a
surgeon, teacher and counselor
at the School of Medicine and Hospital
for his distinguished military career
and for his public service
to the citizens of Maryland

FEBRUARY 5, 1973

Fittingly, a silver Queen Anne platter was presented to Mrs. Yeager inscribed:

With thanks
to
Dorothy Stone Yeager
A gracious and gifted lady

The weight of George Yeager's character was well displayed in his genuine search of values of the past, not only those that related to people, but to buildings. Never one to shirk these responsibilities, his mission as a historic preservationist was to reignite, to rehabilitate past treasures, and place them viably in a contemporary context. This clear type of gene vision was a noble part of him, one which sought to preserve and not to allow decay.

(From left) Dr. and Mrs. George Yeager, Dr. W. H. Toulson, Dr. and Mrs. Huntington Williams.

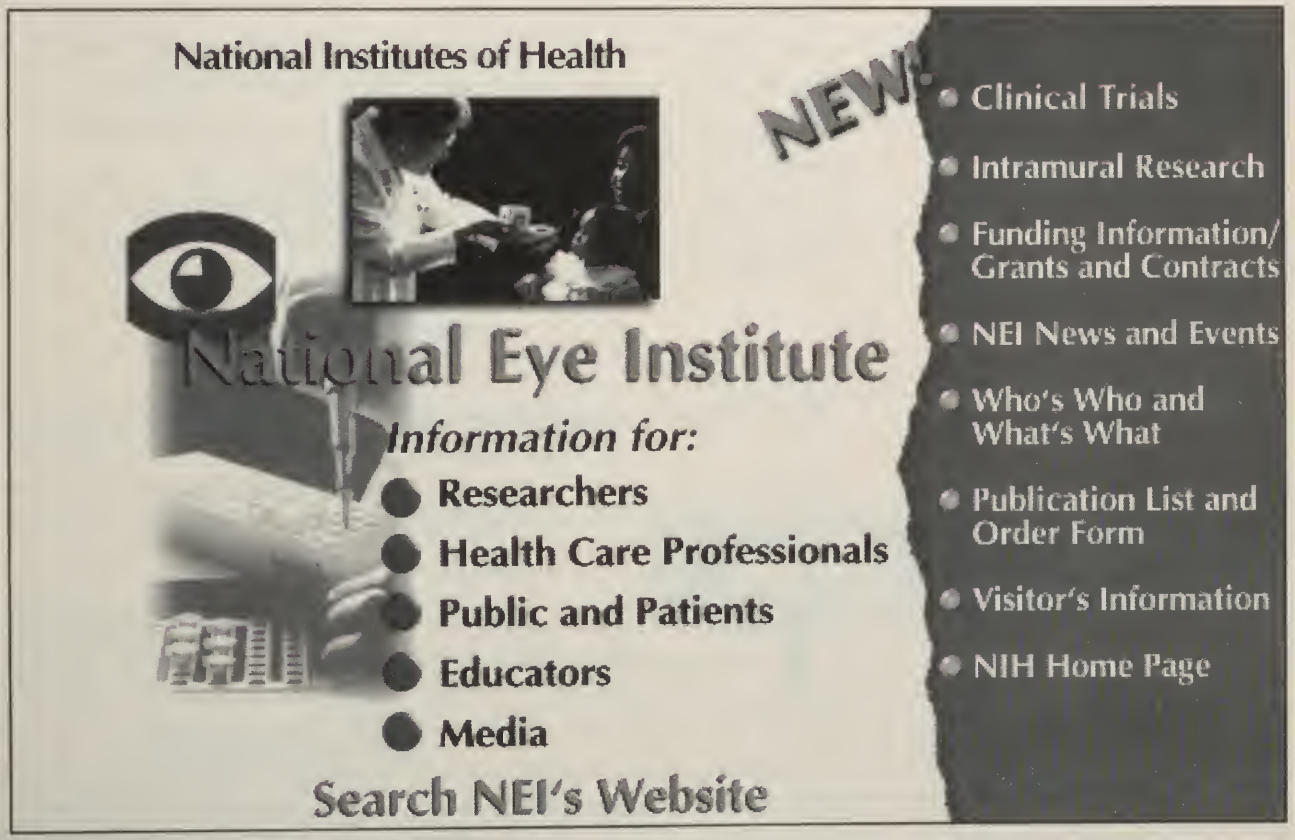
These remarkable traits were illustrated in his crusade for a rebirth of Davidge Hall, restoration and expansion of the antiquated University of Maryland Hospital, and the building of its north extension. Countless public health and civic enterprises profited from his capable contributions and leadership. These included the Maryland State Advisory Committee on Regional and Medical Programs, the American Cancer Society of Maryland, the Maryland Medical Legal Foundation, Inc., and Chairman, Medical Care Committee of the Maryland State Planning Commission, 1946-1965. At the Union Memorial Hospital he was elected the first male president in its 119-year history in 1971. He retired there in 1976 and was immediately appointed director of the Deaton Extended Care Facility, which blossomed under his wise guidance.

Serious medical difficulties did not deter or interfere with his life mission—to serve. He doggedly resumed an active life after a serious abdominal operation in the 1970s. Even later, in his twilight years, George Yeager remained alert, involved in daily activities and the tender care of Dorothy, his dear wife.

In closing, let me comment personally about my relationship with George Yeager which extended over many years. It was expressed in a prayer presented to a medical group:

> Heavenly Father, there are those who excel because of their sincerity, honesty, wise equanimity, trust and consideration for everyone, privileged or underprivileged. These were the valued traits of our dear and respected colleague, George Yeager. Bless his loving family and keep him under Your care.
>
> January 8, 1998

Theodore E. Woodward, M.D., M.A.C.P.
Dr. Woodward is professor of medicine emeritus, University of Maryland School of Medicine ■



National Eye Institute announces a new clinical trials database on their web site, http://www.nei.nih.gov

Books, Etc.

Book review editor:
Chris Papadopoulos, M.D.

Dr. Rosenfeld's Guide to Alternative Medicine.
Isadore Rosenfeld, M.D., Random House, Inc., New York, 1996, 342 pages, $25.95 (Book Club editions available).

In 30 chapters, Isadore Rosenfeld, M.D., a professor of clinical medicine at Cornell, covers many alternative medicine practices. For each one, he looks at the historical basis, the theory (if any), and the practical applications. Where there is evidence for or against effectiveness, he reviews and comments on the quality of that evidence. He occasionally intersperses personal anecdotes, usually relating his experience as a recipient of the therapy. For each practice he provides a quick summary and a personal recommendation. He is not bashful and is not afraid to say, "This is possibly useful for condition X, but forget the rest of the claims." He also points out where he thinks further study is needed.

The book is written for a lay audience so the literature citations are identified skimpily, if at all. It would have been nice to have more references, but it has nonetheless earned a place in my library. After three chapters covering general topics including the placebo effect and quackery, his discussion ranges from acupuncture through reflexology, with stops including the esoteric (iridology), popular (magnet), timeless (spas and springs), and a sampling of herbs. The book is well indexed; when a patient asks about a therapy or herb or supplement, I can readily produce information and an opinion from an author they may have heard of, since he has written several other popular books.

His writing style makes reading enjoyable, and the length and self-contained nature of each chapter make it easy to stop and start without losing the train of thought. The book is, however, not comprehensive and contains a couple of factual and mechanistic errors in the oxygen therapy chapter. For practitioners who receive a lot of questions about herbs and supplements, other references will be needed, but Rosenfeld covers most of the alternative medicine practices currently receiving press coverage. This is definitely a keeper.

Richard C. Moore, M.D., M.P.H.
Dr. Moore is a family physician in Danville, Virginia.

■ ■ ■

Rheumatic Fever and Streptococcal Infection: Unraveling the Mysteries of a Dreaded Disease.
Benedict F. Massell. Distributed by the Harvard University Press for the Countway Library of Medicine, Boston, 1997, 394 pages.

This book should be of considerable interest to physicians with an interest in the history of medicine as well as older physicians who remember the impact of streptococcal disease and its cardiac sequelae. In 15 chapters, the author covers the very early history of rheumatic fever; the amassing of evidence on the streptococcal etiology of rheumatic fever with its joint manifestations, chorea, and acute cardiac symptoms; the confirmation of the connection between rheumatic fever and subsequent cardiac valvular disease; and the discovery of prophylactic treatment with sulfomides and penicillin. There are

also chapters on the pathogenesis of the disease, the possibility of vaccine for prevention of streptococcal infections, and the change in morbidity and mortality over the past decades.

One of the most extensively referenced books that we have ever read, each chapter has from 45 to 106 references. We were pleased to see a reference to the work of Dr. Ernest Stebbins, former dean of the Johns Hopkins School of Public Health for his work in New York City in 1937, and to Dr. Helen Taussig for her work in the treatment of streptococcal disease with sulfonamide in 1943 and in an epidemiologic study of the disease in 1938. We were somewhat disappointed to find very little on the rehabilitation aspects of the disease and its related complications, but this is a minor omission.

In summary, we enjoyed the book and think that anyone with a curiosity for history will find it interesting.

Tamara Lauter, M.D. and Timothy Baker, M.D., M.P.H.

Dr. Lauter is from the department of physical medicine and rehabilitation, Johns Hopkins University, and Dr. Baker is from the department of international health, Johns Hopkins University. ■

Parris N. Glendening - Governor of Maryland

DHMH Maryland Department of Health & Mental Hygiene

Martin P. Wasserman, M.D., J.D., Secretary
Department of Health & Mental Hygiene

Carlessia A. Hussein, Dr. P.H., Director
Community & Public Health Administration

Diane M. Dwyer, M.D., Director
Epidemiology & Disease Control Program

EPIDEMIOLOGY AND DISEASE CONTROL PROGRAM

201 West Preston Street, Baltimore, Maryland 21201 (410) 767-6700

August/September, 1998
Selected Communicable Diseases in Maryland in 1997
(Continued from May/June, 1998)

Please refer to the May/June issue for a description of communicable disease surveillance in Maryland and for Tables 1 and 2, "Cases (and Rates) of Selected Notifiable Diseases Reported in Maryland in 1997 by County." All incidence rates in this article are expressed as cases per 100,000 population per year. All rate maps place cases by county of residence at the time of diagnosis. The spot maps place cases within their *zipcode* of residence, but with *county* boundaries displayed on those maps. A few minor changes have been made to some case counts published in the May/June issue (*H. influenzae* disease, hepatitis A, Lyme disease, and animal rabies). Please contact the Division of Communicable Disease Surveillance (410-767-6712) for an up-to-date table of cases and rates.

HAEMOPHILUS INFLUENZAE DISEASE (65)
1.3/100,000 (U.S. 0.4/100,000)

The 65 reported cases of invasive disease due to *Haemophilus influenzae* (all serotypes and among all ages) included bacteremia (28 cases, 43%), pneumonia (27 cases, 42%), meningitis (4 cases, 6%), epiglottitis (1 case, 2%), and other infections (5 cases, 8%). Figure 1 illustrates the trend for invasive *H. influenzae* disease for the past 11 years (1987-1997). Active surveillance for *H. influenzae* disease of all serotypes and among all ages began in November 1991.

Table 1a and Figure 2 show the number of cases by jurisdiction for 1997. Baltimore City and Baltimore County reported 38 cases--58% of all reported cases.

In 1997, the overall incidence rate for males was 1.0 (26 cases) and 1.5 (39 cases) for females. The rate for whites was 1.0 (36 cases) and 1.7 (26 cases) for nonwhites. For the 63 cases whose outcome was known, the 1997 case fatality rate was 11.1% slightly higher than the 1996 rate of 9.2%.

The number of cases by age category from 1987 to 1997 is shown in Figure 3. *H. influenzae* type b (Hib) has been virtually eliminated among children in Maryland! The number of cases in children 2-59 months of age, the vaccine preventable age category, was 4 and only 1 of these was serotype b. This Hib case occurred in a 1 year old who had received three doses of Hib vaccine,

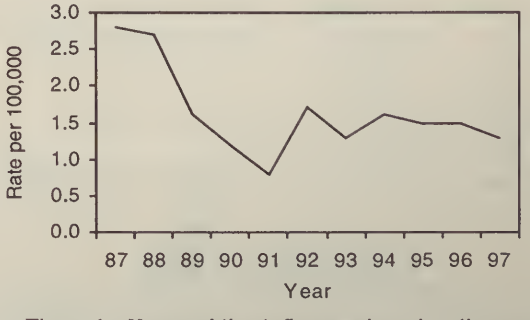


Figure 1. *Haemophilus influenzae* invasive disease (all serotypes). Incidence in Maryland, 1987 – 1997.

but not a fourth dose. The child was considered up-to-date at the time of their illness. Overall, for all serotypes, the age of cases ranged from one day old to 93 years (median 55 years).

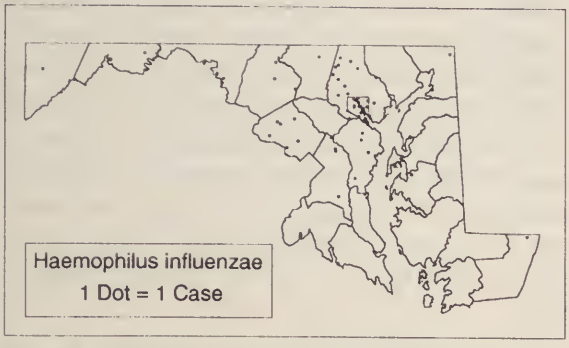


Figure 2. *Haemophilus influenzae* invasive disease (all serotypes), Maryland, 1997.

Data on the serotype of *H. influenzae* isolates were available for 56 (86%) cases. The distribution by serotype for these cases is: 36% serotype b, 36% serotype f, and 29% nontypeable.

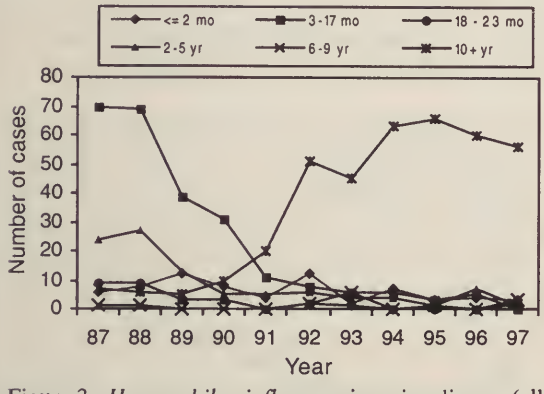


Figure 3. *Haemophilus influenzae* invasive disease (all serotypes). Cases reported by age group, Maryland, 1987 – 1997.

HEPATITIS A (188)
3.7/100,000 (U.S. 10.4/100,000)

The incidence rate of acute hepatitis A per 100,000 in Maryland in 1997 (3.7) decreased from the rate in 1996 (5.0). In 1997, Montgomery County, Baltimore City, and Prince George's County accounted for 60% of the cases in the state with 45, 35, and 33 cases, respectively. The highest rate occurred in Charles County (13.0), followed by Calvert (7.3), Montgomery (5.5), Kent (5.3), Baltimore City (5.2), and Prince George's County (4.2).

The ratio of male to female cases was 1.5:1. The case ratio of whites to non-whites was 2.1:1; the rate per 100,000 in whites was 3.1 compared to 3.4 in non-whites. Non-white males had the highest rate (4.6) followed by white males (3.5) and white females (2.7). While 65% of cases were 20-49 years-old, the age group 20-29 had the highest rate (6.7).

Of the 147 persons reporting an occupation, 14 reported jobs with increased risk of acquiring or transmitting hepatitis A: 10 foodhandlers, 3 health care providers, and 1 child care provider.

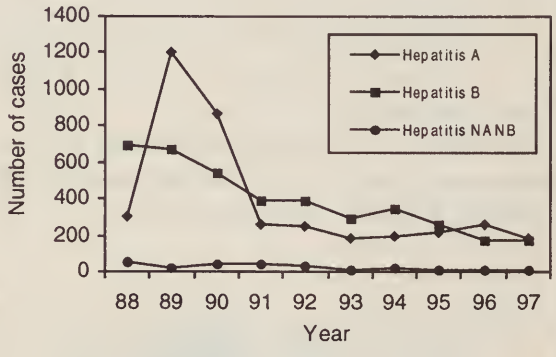


Figure 4. Hepatitis (A, B, NANB). Cases reported, Maryland, 1988 – 1997.

Among cases on whom information was available, 35 had traveled outside the U.S. or Canada, 24 had contact to a confirmed case of hepatitis A (10 of which were household, 7 were sexual, and 7 were other contact), 22 had consumed raw shellfish, and 21 were part of a common-source outbreak.

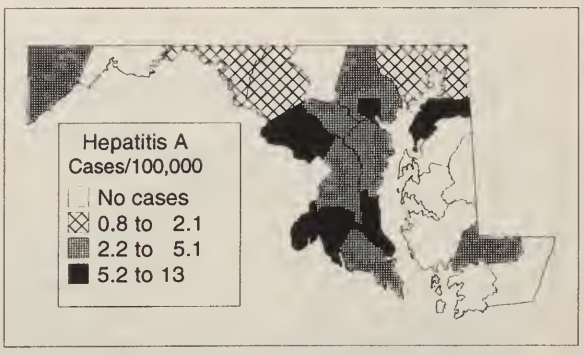


Figure 5. Hepatits A. Incidence in Maryland, 1997.

HEPATITIS B (172)
3.4/100,000 (U.S. 3.3/100,000)

The incidence rate per 100,000 in 1997(3.4) is roughly equivalent to the rate in 1996(3.3). The highest rates occurred in Dorchester County (10.0), followed by Baltimore County (7.1), and Charles County(5.2).

The ratio of male to female cases was 1.1:1. The incidence rate was 4.2 in males and 2.5 in females. The incidence was highest in the 30-39 year age group for males, and in the 20-29 year age group for females. For both sexes combined, the incidence rate was highest in the 30-39 year age group. Among the 90% of cases for which race is known, the rate in nonwhites (6.1) was 3.6 times higher than the rate in whites (1.7). Of the 53 adults with known occupation (excluding students and unemployed), only 4 were health care providers with direct patient contact.

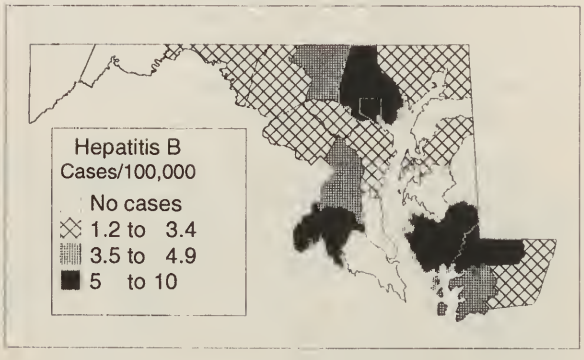


Figure 6. Hepatitis B. Incidence in Maryland, 1997.

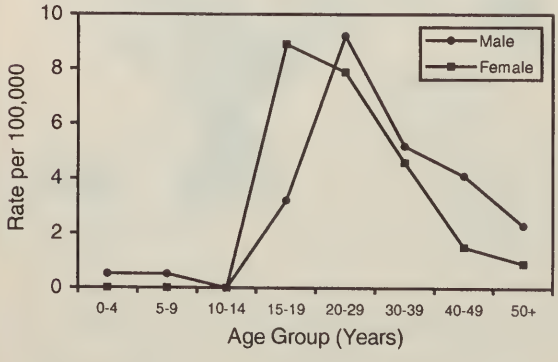


Figure 7. Hepatitis B. Incidence by age group and sex, Maryland, 1997.

Sixty-two of the cases reported exposures with potential risk for acquiring hepatitis B during the 6 months prior to onset of illness, while 110 reported no known risk factors. Forty-five reported a single risk factor while seventeen reported multiple risk factors. The risk factors reported included multiple sexual partners (22), dental work or oral surgery (18), use of needles for injection of street drugs (14), homosexual or bisexual orientation (10), surgery (11), medical or dental field employee (4), transfusion (4), and contact with a confirmed or suspected case of hepatitis B(1).

LEGIONELLOSIS (23)
0.45/100,000 (U.S. 0.4/100,000)

The 23 reported cases of legionellosis in 1997 represented a 59% decrease over the number of cases reported in 1996 (39). The number of cases by jurisdiction is shown in Table 1b. Harford County (6 cases) had the highest rate in the state (2.8) followed by Washington County, (3 cases, 2.3).

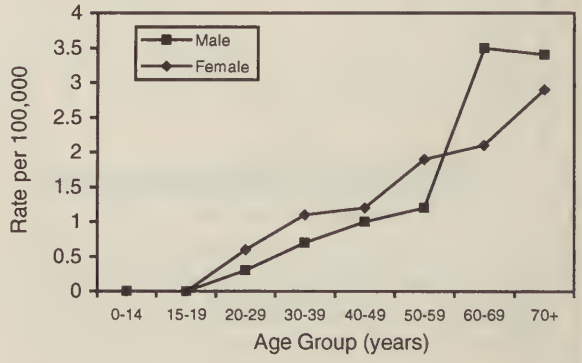


Figure 8. Legionellosis. Incidence by age group and sex, Maryland, 1997.

The male to female ratio was 1.3:1. The incidence rate in females (0.4) was lower than that found in males (0.5). The ratio of white to non-white cases was 1.8:1. Ages ranged from 21 to 88 years with a median of 55 years. The incidence by age group and sex is shown in Figure 8. There were 7 deaths among the 23 cases yielding a case fatality rate of 30.4%.

Seventeen of the 23 cases had information available on risk factors associated with legionellosis. Nine (53%) smoked more than 10 cigarettes per day, and six (35%), were immunosuppressed (1 diabetes mellitus, 2 cancer, 1 AIDS and 2 being treated with corticosteroids). One of the seventeen cases was transferred directly to a hospital from outside of this country, and 3 of the 17 (18%), had been hospitalized for 3 or more days within two weeks of disease onset.

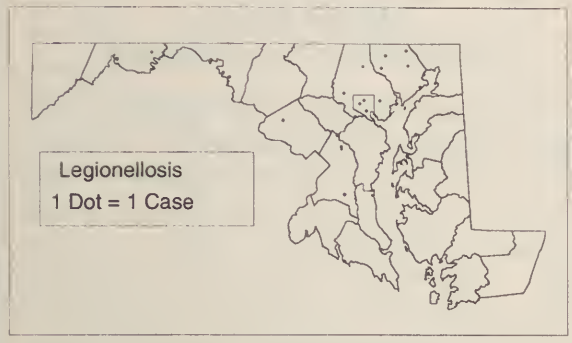


Figure 9. Legionellosis. Maryland, 1997.

LYME DISEASE (494)
9.7/100,000 (U.S. 4.1/100,000)

During 1997, 494 cases of Lyme disease were reported, an increase of 17% from 1996 (423 cases). The trend over the past ten years is shown in Figure 10. The highest rate occurred in Kent County (126.6), followed by Queen Anne's (82.1), Caroline (61.0), and Calvert (41.2) (Figure 12).

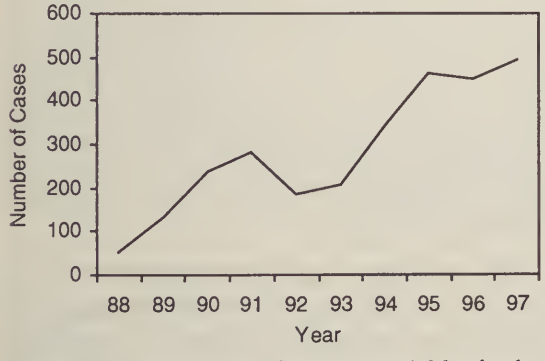


Figure 10. Lyme disease. Cases reported, Maryland, 1988-1997.

The male to female ratio was 1.2:1. Among the 397 cases with known race, 359 (90.4%) were white, 31 (7.8%) were black and 7 (1.8%) were other races. Ages ranged from 3 months to 86 years (median 31 years). Sixty-five percent of the patients were 15 years of age or older.

Figure 11. Lyme disease, Maryland, 1997.

A definite tick bite prior to onset was reported in 185 (40%) cases, 106 (23%) had no known tick exposure, and 175 (38%) were uncertain of exposure.

Of the 494 cases, 415 (84%) had onsets of illness in April through October. The peak incidence occurred during June (125 cases) and July (124 cases). Physicians reported erythema migrans in 282 (57%) cases, arthritis with joint swelling in 203 (41%), Bell's palsy in 56 (11%), lymphocytic meningitis in 17 (3%), radiculoneuropathy in 25 (5%), encephalitis in 11 (2%), and atrioventricular block in 8 (2%).

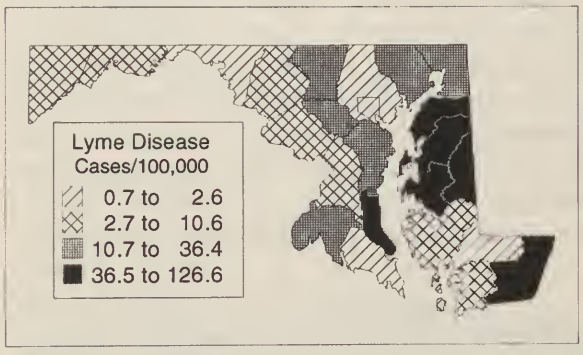


Figure 12. Lyme disease. Incidence, Maryland, 1997.

MALARIA (85)
1.7/100,000 (U.S. 0.7/100,000)

The incidence of malaria in Maryland remained stable in 1997. Eighty-five cases of malaria were reported in 1997 compared to 87 cases in 1996. All cases were lab-confirmed.

Eight counties and Baltimore City reported cases in 1997. The majority were reported by Montgomery County, (42 cases, 49.4%), and Prince George's County, (30 cases or 35.3%).

Cases were seen in males more often than females (ratio 1.5:1). Whites and Asians were affected equally, (each making up 11.8% of cases), blacks accounted for 65.9% of cases and 10.6% of cases were "other" or of unknown race. The cases ranged in age from 11 months to 76 years, (median 31 years). Thirty-six cases, (42.4%), were hospitalized and no deaths were reported. Of the 61 cases for which previous malaria status is known, 18% reported previous episodes.

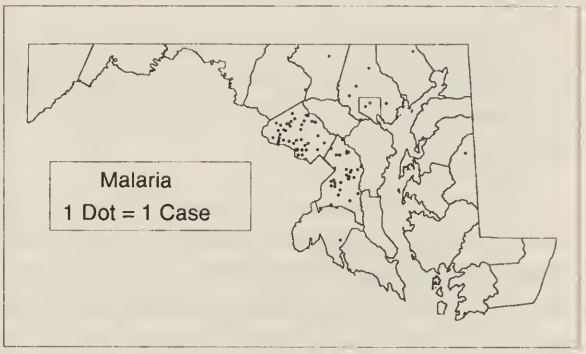


Figure 13. Malaria (all species), Maryland, 1997.

Most of the cases (48 cases or 56.5%), were caused by *Plasmodium falciparum*. Eighteen cases (21.2%) were caused by *P. vivax*, two (2.4%) by *P. ovale*, and one (1.2%) by *P. malariae*. Sixteen cases (18.8%) were of an unconfirmed *Plasmodium* species. One case was reported to have a new onset infection with *P. falciparum* after traveling out of the country, followed by a flare of his chronic *P. vivax* infection several months later.

Of the eighty-five cases, 76 (89.4%) were judged to be due to international import. Information about the remaining cases was not available. The location of import was known for 72 of the cases: 5.3% were imported from India, 19.4% from Nigeria, 12.5% from Sierra Leone, and 41.7% from other African countries; 4.2% were imported from South America and 5.6% from Central American countries.

P. vivax came primarily from India (6/15 *P. vivax* cases or 40%), whereas *P. falciparum* was imported primarily from Nigeria (12/41 or 29.3% of *P. falciparum* cases), Sierra Leone (17.1%), Ghana (12.2%), and other African countries (15/41 or 36.6% of *P. falciparum* cases). Five of the six cases (83.3%) who reported travel to Ghana and seven of the nine (77.8%) who traveled to Sierra Leone were infected with *P. falciparum*. Three of the four cases who traveled to Central America were infected with *P. vivax*.

Of the 61 cases for whom information on malaria prophylaxis was available, only 15 (25%) reported taking any prophylaxis prior to their illness.

MEASLES (2)
0.02/100,000 (U.S. 0.05/100,000)

Two cases of measles were reported in 1997, one in Baltimore City and one in Wicomico County. Two cases were also reported in 1996, these two years being the lowest number of cases recorded in Maryland since records have been kept. Both cases were again international importations, so the last indigenous transmission of measles in Maryland occurred in 1994. During the prior 5 years (1992-1996) the median number of reported cases was four.

MENINGITIS (ASEPTIC) (342)
6.7/100,000 (U.S. - N/A)

There was a sharp increase in the number of reported cases--from 210 in 1996 to 342 in 1997, an increase of 63%. There were 7 deaths among the 342 cases resulting in a case fatality rate of 2.0% similar to the 1996 rate of 1.9%. As in the previous five years, the two counties with the highest number of cases were Montgomery (70) and Prince George's (62). The highest incidence rates were observed in Calvert County (23.5) and in Washington County (16.3). Over half of the cases (58%) occurred during the four-month period from July to October.

The incidence rate for females was 7.0, slightly higher than the rate of 6.4 for males. The rate for whites was 5.7 compared to a rate of 7.1 for non-whites. (Race was unknown for 24 or 7.0% of the cases.) Age-related incidence was highest (64 cases, 17.5/100,000 population) in the birth to 4 year age group; children under 1 year of age accounted for 43 (67%) of the cases in this age group. The etiology was reported for only 10 cases: 1 adenovirus, 4 enterovirus and 5 herpesvirus.

MENINGOCOCCAL DISEASE (42)
0.8/100,000 (U.S. 1.2/100,000)

The number of reported cases decreased by 27.6%, from 58 cases in 1996 to 42 cases in 1997. For 1990-1997, the average number of cases reported per year was 46. In 1997, there were 4 deaths among the 42 cases, for a case fatality rate of 9.5%; in 1996, the case fatality rate was 10.3%.

Figure 14 shows the number of cases by jurisdiction. Baltimore City (14 cases), Baltimore County (11), Prince George's County (6), and Anne Arundel County (4) accounted for 83.3% of the 1997 cases. Three months, January-March, accounted for about half (51.2%) of the 1997 cases.

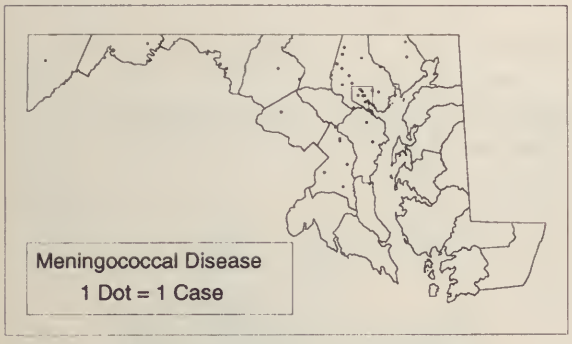


Figure 14. Meningococcal disease (all serogroups), Maryland, 1997.

The 1997 incidence rate for males was 1.1, almost twice the rate of 0.6 for females. The 1997 case rate for non-white races (0.9) was about the same as the rate for whites (0.8). Four age groups were notable for their high incidence rates: birth to 4 years (2.5), 10-14 years (1.7), 15-19 years (2.6), and 20-24 years (1.9). These four age groups accounted for 69.0% of all cases. Twenty of the cases presented with meningitis, 17 with meningococcemia, 4 with pneumonia, and 1 with arthritis.

MUMPS (1)
0.1/100,000 (U.S. 0.2/100,000)

The 1997 case total was the lowest on record since record keeping began in 1920, continuing a downward trend in mumps incidence since 1991. The decrease from 41 cases in 1996 to 1 case (from Carroll County) in 1997 can be at least partially attributed to a change in case definition. Beginning in 1997, a case of mumps must be laboratory confirmed or be epi-linked to a laboratory confirmed case in order to be counted. (Forty-five possible mumps cases were reported, only one of which met this new case definition.) The prior 5 year median (1992-96) is 41 cases. The trend in mumps incidence rates over the last 10 years is shown in Figure 15.

PERTUSSIS (119)
2.3/100.00 (U.S. 2.1/100,000)

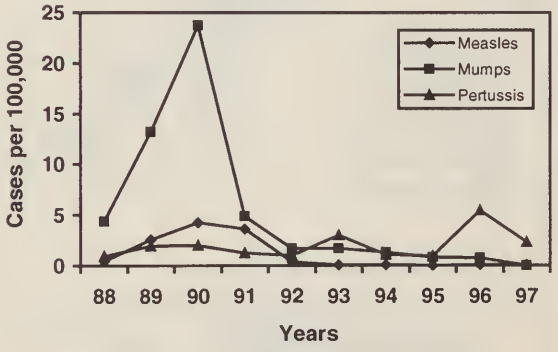


Figure 15. Measles, mumps, pertussis. Incidence, Maryland, 1998-1997.

The number of reported cases decreased by 57% from 278 cases in 1996 to 119 cases in 1997. The trend over the past ten years is shown in Figure 15. The number of cases by jurisdiction in 1997 is shown in Table 1a (in the May/June issue) and rates are displayed in Figure 16. There were no outbreaks reported.

The ratio of male to female cases was 0.9:1 and the ratio of white to non-white cases was 3.6:1. Ages ranged from 7 days to 58 years. The median age was five years. Forty-eight cases (40.3%) were under one year of age, including three newborns (2.5%) and 36 (30.2%) who were between one and five months old.

The following symptoms were reported: paroxysmal cough (109, 92%); post-tussive vomiting (72, 61%); whoop (57, 48%); and apnea (44, 37%).

One pertussis-related death was reported. This death occurred in a white, non-Hispanic female who was 2 months old at cough onset. This child was born at 29 weeks gestation and had a history of mild bronchopulmonary dysplasia. The death certificate listed cardiac failure as the immediate cause of death with pneumonia and pertussis listed as underlying causes of death.

Of the eighty-seven (73.1%) cases that were cultured, 35 (40.2%) were culture positive. Twenty-one (60%) of the culture confirmed cases were also DFA positive.

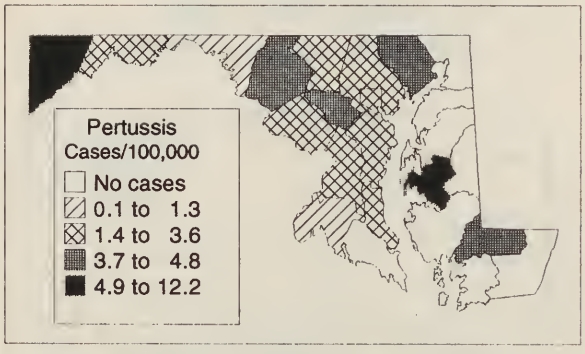


Figure 16. Pertussis, Maryland, 1997.

RABIES (ANIMAL) (619) (U.S. 7,853)

September 1981 marked the beginning of the raccoon rabies epizootic in Maryland. Since then, confirmed cases have occurred in all 23 counties and Baltimore City. Figure 17 shows the trend for the past 16 years. In 1997, animal rabies was reported from all Maryland jurisdictions (Figure 18). Counties with the largest number of rabid animals were Anne Arundel (97), Frederick (72), Montgomery (66), and Baltimore County (52). In 1997, 619 of the 5,919 animals submitted for laboratory examination were positive for rabies, a decrease of 4.8% from the 637 reported positive in 1996.

Raccoons continue to account for the majority of laboratory confirmed rabid animals in Maryland (494, 80%). Other species included foxes (44, 7%), skunks (37, 6%), cats (23, 4%), bats (11, 2%), groundhogs (6, 1%), and cattle, dogs, beaver, and opossums (1 each, <1%).

Bat rabies, unrelated to the raccoon epizootic, accounted for 11 (2%) of the positive animals. The last human case of rabies reported in Maryland resulted from a bat bite in 1976. There were 26 ferrets tested for rabies in 1997, all of which were negative.

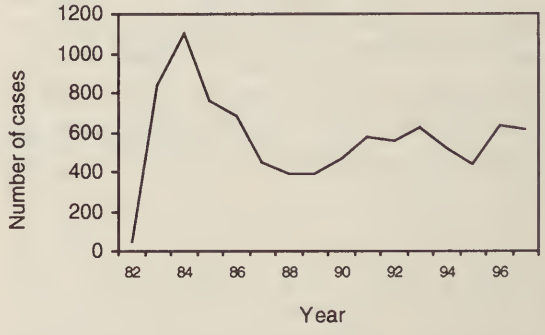


Figure 17. Animal rabies. Cases reported, Maryland, 1982-1997.

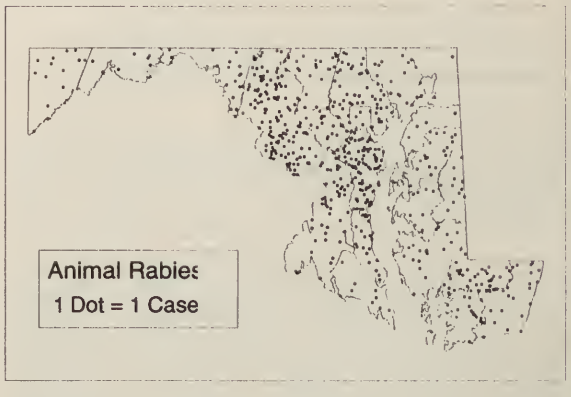


Figure 18. Animal Rabies. Maryland, 1997.

ROCKY MTN. SPOTTED FEVER (20) 0.4/100,000 (U.S. 0.1/100,000)

On October 1, 1996, RMSF became laboratory reportable in Maryland. In 1997, twenty cases of RMSF were reported from 11 counties. The highest incidence rate was reported from Talbot County (15.3). The number of reported cases declined from 1996 when 38 cases were reported, 16 of which were from Saint Mary's County. No cases were reported by Saint Mary's County in 1997.

Four of the cases were confirmed by a four-fold rise in antibody titer, while the remaining 16 cases had clinically compatible symptoms with a single IFA titer of ≥1:64. Eighteen cases (90%) had onsets between May and September. June and July were the peak months, with 5 cases each. The

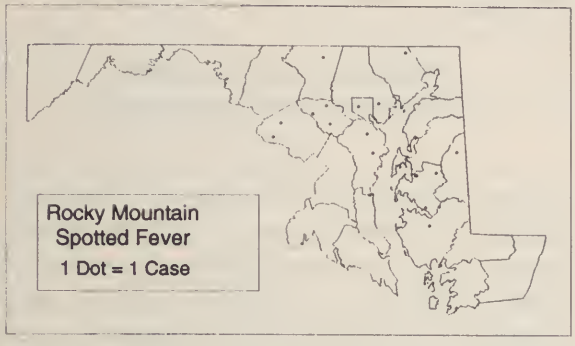


Figure 19. Rocky Mountain Spotted Fever. Maryland, 1997.

age of cases ranged from 4 to 86 years (median 36 years). The ratio of male to female cases was 0.8:1. Nineteen cases were white and one was black. Four cases (20%) were hospitalized and no deaths were reported. Exposure information was available for 18 cases: six cases reported a tick bite or attachment within 14 days of onset.

SALMONELLOSIS (1,231)
24/100,000 (U.S. 15/100,000)

In 1997, 1,231 cases of salmonellosis were reported in Maryland; 1153 (94%) were culture-confirmed and the remaining 78 (6%) were probable cases which were epidemiologically linked to laboratory confirmed cases. The trend of reported salmonellosis over the past ten years is shown in Figure 20. For the past seven years the number of reported cases has remained steady, with approximately 1,000 to 1,300 cases reported per year. Incidence of disease in 1997 was highest in the warmer months, with 49% of onsets occurring from June through September. Salmonellosis rates by jurisdiction are shown in Figure 21. The highest rates were observed in Charles (93.4), Somerset (48.9), and Dorchester (46.5) Counties.

The male to female ratio was 0.9:1. The ratio of whites to non-whites was 1.4:1 (25.8% had unknown race). The highest rate of infection by five year age groups was in the birth to 4 year group (88.2), followed by children 5-9 years old (32.1). In adults, the highest rate was observed in the 60-69 year age group (20.6). There were 261 hospitalizations for salmonellosis and 4 deaths.

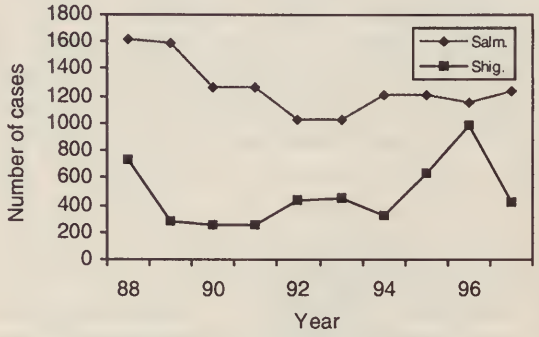


Figure 20. Salmonellosis and shigellosis. Cases reported, Maryland, 1988-1997.

Of the 888 (72%) isolates for which serotype information was available, 224 (25%) were *S.* Enteritidis. The four other most frequently reported serotypes were: *S.* Typhimurium (184, 21%), *S.* Heidelberg (170, 19%) *S.* Braenderup 93, (11%), *S.* Newport 49, (6%). For the past three years *S.* Enteritidis has represented at least 40% of the isolates that were serotyped. The 15% decline this year was in part due to an increase in *S.* Heidelberg and *S.* Braenderup isolates from large outbreaks.

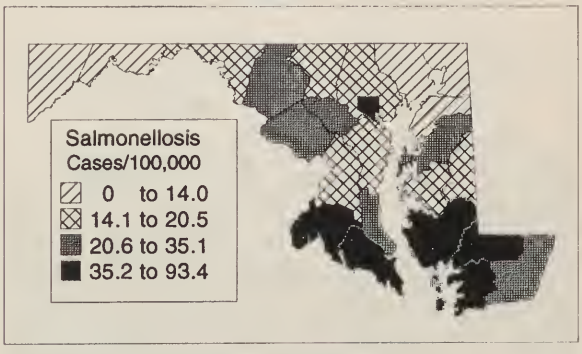


Figure 21. Salmonellosis. Maryland, 1997.

There were ten outbreaks of salmonellosis reported by nine counties, resulting in 783 cases. All of the outbreaks resulted from foodborne transmission. Seven of the outbreaks occurred in restaurants, one in a private home, one in a food processing plant, and one at a church event.

SHIGELLOSIS (423)
8.3/100,000 (U.S. 7.8/100,000)

Maryland reported 423 cases of shigellosis in 1997, a sharp decrease (57%) from the 985 cases reported in 1996 (Figure 20). The number of cases by jurisdiction is shown in Table 1a (in the May/June issue). Of the reported cases of shigellosis, 401 (95%) were laboratory confirmed and 22 (5%) were probable cases which were epidemiologically linked to laboratory confirmed cases. Eighty-five percent of the reported cases occurred in Baltimore City, Prince George's County, Baltimore County, Montgomery County, and Anne Arundel County, which account for 68% of Maryland's population. Worcester County reported the highest rate per 100,000 population (24.3), followed by Baltimore City (19.7), Wicomico County (16.1), and Kent County (15.8) (Figure 22).

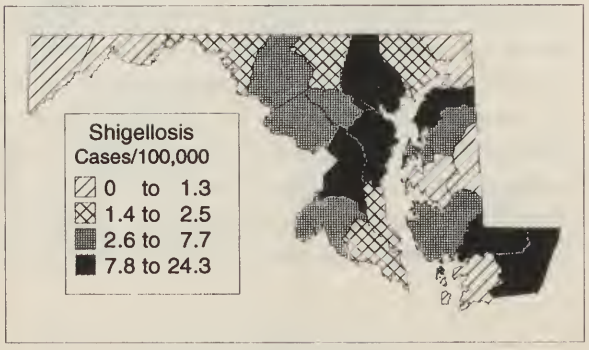


Figure 22. Shigellosis. Maryland, 1997.

The ratio of male to female cases was 1:1. The ratio of cases among whites compared to nonwhites was 0.4:1; the race of 17% was unknown. Most cases occurred among young children. The highest annual rates per 100,000 population occurred in the birth to 4 years age group (34.2) and the 5-9 years age group (23.5), with a total of 215 cases (51%) of shigellosis occurring among children under the age of 10. There were 43 hospitalizations and no reported deaths.

Of the 396 (94%) isolates for which the species was known, 356 (89.9%) were *S. sonnei*, 36 (9.1%) were *S. flexneri*, 2 (0.5%) were *S. boydii*, and 2 (0.5%) were *S. dysenteriae*. One case of *S. dysenteriae* had a history of travel outside the United States, while the other case was a close contact of a symptomatic individual who had a history of travel outside of the United States.

In 1997, a total of 9 outbreaks of shigellosis were reported from 4 jurisdictions. The outbreaks occurred in 7 day care centers, a food service facility, and a private home.

TUBERCULOSIS (340)
6.6/100,000 (US 6.4/100,000)

The number of reported tuberculosis cases declined 18.5% from 1993 (417) to 1997 (340). The trend of TB cases since 1980 is shown in Figure 23. The number of cases by jurisdiction is shown in Table 1a (in the May/June issue) and in Figure 24. Baltimore City, Montgomery, and Prince George's counties reported 27%, 22%, and 18%, respectively, of all cases in 1997.

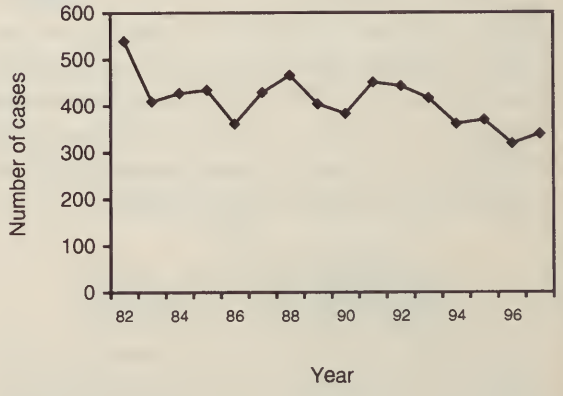


Figure 23. Tuberculosis. Cases reported, Maryland, 1982-1997.

The ratio of male to female cases was 1.2 to 1. Rates per 100,000 population for race/ethnicity groups were highest among Asians (rate 32, 61 cases), followed by blacks (rate 13.5, 186 cases), Hispanics (rate 13.5, 23 cases), and whites (rate 2.0, 70 cases). Rates increased progressively with increasing age, with the lowest among children under 14 years of age (2.0), and the highest rates occurring in those 65 years and older (16.6). Six and one half percent (22) were children 14 years of age or younger, 25% (86) were 15 to 34 years of age, 40% (137) were 35 to 64 years, and 28% (95) were 65 years and older. Thirty nine percent (132) of all cases were foreign-born.

A match of the tuberculosis and AIDS registries for 1997 identified 50 (15%) persons with both infectious diseases, compared to 30 (10%) in 1996, 39 (11%) in 1994, 41 (10%) in 1993, and 60 (14%) in 1992.

Drug resistance has not been a significant problem in Maryland. In 1997, only 14 (4%) of the reported cases were isoniazid (INH) resistant, 1 (0.3%) rifampin resistant, and 1 (0.3%) resistant to at least INH and Rifampin.

Directly Observed Therapy (DOT), the observation by trained health care workers of every dose of medication taken, is still a high public health priority in Maryland. In 1997, 90% of patients diagnosed received DOT compared to 86% in 1996, 82% in 1995, 73% in 1994, and 33% in 1993.

Sexually Transmitted Diseases

SYPHILIS, PRIMARY AND SECONDARY (889) 17.4/100,000 (U.S. 3.0/100,000)

The 889 cases of primary and secondary (P&S) syphilis reported in 1997 represents a 29% increase from the 733 cases reported in 1996. Figure 25 shows the trend of P&S incidence in Maryland over the past 10 years. The number of cases by jurisdiction is presented in Table 1a (in the May/June issue). Rates by jurisdiction are shown in Table 2a and in Figure 26. For the third consecutive year, Baltimore City was primarily responsible for the observed increase, and accounted for 75% of all case reports in Maryland.

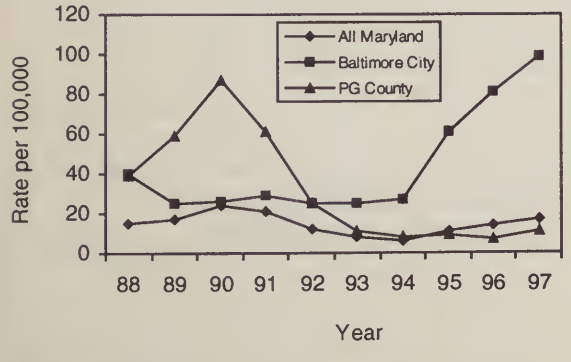


Figure 25. Primary and secindary syphilis. Incidence, Maryland, 1988-1997.

The ratio of male to female cases was 1.2 to 1. The race of 91% of the cases was specified as nonwhite. Sixty-seven percent of the cases were in the 20-39 year age group.

Since 1988 all P&S and early latent syphilis cases seen in public STD clinics have been offered HIV testing. The percent of co-infection in those tested had decreased each year, from 18% (66/372) in 1988 to 6% (55/920) in 1996, but it rose slightly to 10% (53/518) in 1997.

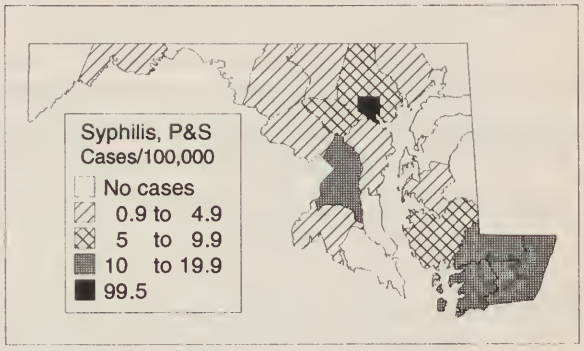


Figure 26. Primary and secondary syphilis. Maryland, 1997.

The number of congenital syphilis cases (60) increased 33% from 1996 (45). The following jurisdictions reported cases: Baltimore City (55), Baltimore County (2) and one each in Howard, Prince George's, and Queen Anne's Counties.

CHLAMYDIA INFECTIONS (13,970) 273/100,000 (U.S. 175/100,000)

Chlamydia trachomatis continues to be the most frequently reported sexually transmitted disease in Maryland: 13,965 cases were reported in 1997. Maryland counties reported an 11% increase compared to 1996, while Baltimore City noted a 55% decrease. Baltimore City accounted for 43% of the reported cases.

GONOCOCCAL INFECTIONS (11,563) 226/100,000 (U.S. 108/100,000)

Reported gonococcal infections increased two percent from 1996. Since 1990, reported cases have declined 53 percent. Fifty-eight percent of the cases were reported by Baltimore City, which also accounted for the highest rate (998) in the State.

The Johns Hopkins Medical Institutions

All courses at the Thomas B. Turner Building unless otherwise indicated. For information on continuing medical education activities, contact the Office of Continuing Medical Education, 720 Rutland Ave., Baltimore, MD 21205, 410-955-2959, Fax 410-955-0807 (e-mail: cmenet@som.adm.jhu.edu).

Fourth annual Johns Hopkins hepato-biliary update, sponsored by the departments of medicine and surgery, Johns Hopkins University School of Medicine, at Dunes Manor Hotel, Ocean City, Maryland. Fee: $350/physicians; $175/residents, fellows, allied health professionals. — **Sept. 11–13**

Sixth annual progress in hematologic malignancies and bone marrow transplantation, sponsored by the division of hematologic malignancies and department of oncology, Johns Hopkins Medical Institutions. Credits: Up to 7.5 Cat 1 AMA credits. Fee: $100/ alumni past registrants; $125/new registrations. — **Sept. 18**

Lipid disorders training programs – basic course, sponsored by Johns Hopkins University School of Medicine and Johns Hopkins Lipid Clinic. Credits: 20.5 Cat 1 AMA credits. — **Oct. 1–3**

Critical issues in laboratory medicine, sponsored by department of pathology, Johns Hopkins University, at the Renaissance Harborplace Hotel, Baltimore. Credits: 11 Cat 1 AMA credits. Fee: $300/physicians; $150/residents, fellows. — **Oct. 2–3**

24th annual topics in gastroenterology and liver disease, sponsored by the Johns Hopkins Medical Institutions Meyerhoff Center for Digestive Disease. Credits: Up to 24 Cat 1 AMA credits. Fee: $495/physicians; $250/residents, fellows. (After 8/14/98, $535 and $285, respectively.) — **Oct. 7–9**

26th annual current topics in geriatrics, sponsored by the Johns Hopkins University School of Medicine Geriatrics Center, at the Renaissance Harborplace Hotel, Baltimore. Credits: Up to 19.5 Cat 1 AMA credits. Fee: $425/physicians; $325/residents, fellows, allied health professionals. — **Oct. 8–10**

40th annual Emil Novak Memorial Course, gynecology, gynecological pathology, endocrinology, and high risk obstetrics, sponsored by the department of obstetrics and gynecology, Johns Hopkins Medical Institutions, at Renaissance Harborplace Hotel, Baltimore. Credits: 45 Cat 1 AMA credits. Fee: $950/physicians; $750/residents, fellows, and allied health professionals. — **Oct. 17–22**

Ophthalmology for the pediatrician, sponsored by the Wilmer Ophthalmological Institute of Johns Hopkins, division of pediatric ophthalmology and strabismus. Credits: Up to 6 Cat 1 AMA credits. Fee: $130/physicians; $100/residents, fellows, allied health professionals. — **Oct. 23**

Lipid disorders training programs – advanced update, sponsored by Johns Hopkins University School of Medicine and Johns Hopkins Lipid Clinic. Credits: 5.5 Cat 1 AMA credits. — **Oct. 24**

Advances in pediatric nutrition, sponsored by the division of pediatric gastroenterology and nutrition, department of pediatrics, Johns Hopkins University School of Medicine, at the Renaissance Harborplace Hotel, Baltimore. Fee: $275/physicians; $220/residents, other health professionals. — **Nov. 2–4**

Topics in ambulatory medicine IX, sponsored by Johns Hopkins University School of Medicine and Johns Hopkins Bayview Medical Center, at the Renaissance Harborplace Hotel, Baltimore. Fee: $550/physicians; $325/residents, fellows, and allied health professionals. — **Dec. 7–9**

University of Maryland

For each course, additional information may be obtained by contacting the Program of Continuing Education, University of Maryland School of Medicine, Room 12-011, BRB, 655 W. Baltimore St., Batlimore, MD 21201 (410-706-3959), or by calling the phone number listed after a specific program. Fax 410-706-3103.

Macular disease for the comprehensive ophthalmologist, sponsored by the University of Maryland School of Medicine in conjunction with the Maryland Center for Eye Care, at BWI Airport Hotel, Baltimore, Maryland. Info: Scott Steidl, M.D., 410-328-5934, Fax 410-328-6346. **Sept. 18**

Miscellaneous

The International Skeletal Society 25th annual refresher course, diagnosis and management of musculoskeletal disorders, sponsored by the International Skeletal Society, at Jury's Hotel, Dublin, Ireland. Credits: 25 Cat 1 AMA credits. Fee: $650/physicians, $425/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Sept. 9–12**

Organ imaging review, sponsored by the University of Toronto, at the Toronto Hilton, Toronto, Ontario, Canada. CME Credits; 28 Cat 1 AMA credits. Fee: $520/physicians; $370/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Sept. 13–19**

Mammography update, sponsored by the University of Toronto, at the Toronto Hilton, Toronto, Ontario, Canada. CME Credits: 28 Cat 1 AMA credits. Fee: $695/physicians; $495/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Sept. 18–20**

7th annual wound care symposium, sponsored by the Office of Continuing Medical Education, Virginia Commonwealth University, Medical College of Virginia Campus, at the Williamsburg Marriott Hotel, Williamsburg, Virginia. Info: Nancie Mervis, 1-800-413-2872 or 804-828-8640, fax: 804-828-7438. **Sept. 18–20**

Southeastern consortium for dermatology, sponsored by the Office of Continuing Medical Education, Virginia Commonwealth University, Medical College of Virginia Campus, at the Omni Richmond Hotel and MCV Campus, Richmond, Virginia. Info: Nancie Mervis, 1-800-413-2872 or 804-828-8640, fax: 804-828-7438. **Sept. 18–20**

Improving health outcomes in diverse populations: building on the MEDTEP experience, sponsored by the Agency for Health Care Policy and Research Funded Minority Centers for Medical Treatment Effectiveness Programs, at the Crystal Gateway Marriott Hotel, Arlington, Virginia. Fee: none/pre-registration required. Credits: CME credits possible. Info: 313-874-6733, email: lmerrill@biostat.hfh.edu. **Sept. 23**

Comprehensive gynecology: a clinical update for the practicing physician, sponsored by the Center for Bio-Medical Communication, Inc., at the Crowne Plaza Manhattan, New York. CME Credits: 13.5 Cat 1 AMA credits. Fee: $575. Info: 201-385-8080, ext. 26, fax: 201-385-8580, email: jrosenberg@cbcbiomed.com. **Sept. 25–27**

Contemporary cardiothoracic surgery, sponsored by the division of cardiothoracic surgery and the Office of Continuing Medical Education, Washington University School of Medicine, St. Louis, Missouri, at the Eric P. Newman Education Center, St. Louis, Missouri. Credits: Up to 21 Cat 1 AMA credits. Fee: $400/general thoracic course, Oct. 1-2, $400/cardiovascular course, Oct. 2-3, $600/combined course, Oct. 1-3. ($450 and $700 respectively after Sept. 1). Info: 314-362-6891 or 1-800-325-9862, fax: 314-362-1087, email: cme@msnotes.wustl.edu. **Oct. 1–3**

Miscellaneous (continued)

5th annual current topics in cardiothoracic anesthesia, sponsored by the Office of Continuing Medical Education, Washington University School of Medicine, St. Louis, Missouri. Info: 314-362-6891 or 1-800-325-9862, fax: 314-362-1087, email: cme@msnotes.wustl.edu. **Oct. 1–3**

Internal derangements of joints: advanced and intensive MR imaging, sponsored by the International Institute for Continuing Medical Education, at the Westin River North, Chicago, Illinois. Credits: approx. 19 Cat 1 AMA credits. Fee: $695/physicians, $495/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Oct. 9–11**

Mt. Sinai 1998 body imaging update, sponsored by the International Institute for Continuing Medical Education, at the Plaza Hotel, New York, New York. Credits: 22.5 Cat 1 AMA credits. Fee: $695/physicians, $450/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Oct. 10–13**

Neuroradiology for the practicing radiologists, sponsored the International Institute for Continuing Medical Education, at Hotel Loretto, Santa Fe, New Mexico. Credits: 20 Cat 1 AMA credits. Fee: $695/physicians, $495/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Oct. 12–15**

1998 infectious disease board review course, sponsored by the Center for Bio-Medical Communication, at the Ritz-Carlton Hotel, Tysons Corner, McLean, Virginia. Credits: Up to 41 Cat 1 AMA credits. Fee: $895/physicians; $695/physicians-in-training. Info: 201-385-8080, fax: 201-385-5650, email: cmeinfo@cbcbiomed.com. **Oct. 14–18**

Mt. Sinai 1998 brain, spine, neurovascular, and ENT imaging update, sponsored by the International Institute for Continuing Medical Education, at the Plaza Hotel, New York, New York. Credits: 25.5 Cat 1 AMA credits. Fee: $675/physicians, $375/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Oct. 14–18**

24th annual symposium on obstetrics and gynecology, sponsored by the Office of Continuing Medical Education, Washington University School of Medicine, St. Louis, Missouri. Info: 314-362-6891 or 1-800-325-9862, fax: 314-362-1087, email: cme@msnotes.wustl.edu. **Oct. 15–16**

CT – MRI state of the art, sponsored by the University of Toronto at the Hamilton Princess, Bermuda. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Oct. 15–18**

Bringing care-givers closer to the patients – a wish-list for the 21st century, sponsored by the Atlantic City Medical Center, at the Sheraton Atlantic City Convention City Hotel. Fee: $100. Info: 609-569-7889, fax: 215-233-4874. **Oct. 16**

New techniques in urinary incontinence and female urology, sponsored by the division of urologic surgery and the Office of Continuing Medical Education, Washington University School of Medicine, St. Louis, Missouri, at the Eric P. Newman Education Center, St. Louis. Credits: Up to 8 Cat 1 AMA credits. Fee: $250/physicians; $150/physician-in-training, allied health professionals, Washington University staff. Info: 314-362-6891 or 1-800-325-9862, fax: 314-362-1087, email: cme@msnotes.wustl.edu. **Oct. 17**

Bridging canyons to the 21st century, sponsored by the American College of Occupational and Environmental Medicine, at the Pointe Hilton Resort at Tapatio Cliffs, Phoenix, Arizona. Info: 847-228-6850, ext. 184, fax: 847-228-1856, website: www.acoem.org. **Oct. 18–22**

New techniques and concepts in cardiology, sponsored by the American College of Cardiology, at The Capital Hilton, Washington, DC. Credits: 16 Cat 1 AMA credits. Info: 800-253-4636, ext. 695 (301-897-5400, ext. 695 outside the U.S.), fax: 301-897-9745. **Oct. 22–24**

Miscellaneous (continued)

Advances in obstetrics and gynecology, sponsored by the Office of Continuing Medical Education, Virginia Commonwealth University, Medical College of Virginia Campus, at the Omni Richmond Hotel, Richmond, Virginia. Info: Nancie Mervis, 1-800-413-2872 or 804-828-8640, fax: 804-828-7438. **Oct. 22–24**

Musculoskeletal MR, sponsored by the University of California, San Diego, School of Medicine, at the Westin Resort Hotel, Hilton Head, South Carolina. Credits: 18 Cat 1 AMA credits. Fee: $650/physicians, $450/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Oct. 22–25**

18th annual comprehensive review of vascular and interventional radiology, sponsored by the University of California, San Diego, School of Medicine, at the Hotel Del Coronado, San Diego, California. Credits: 18.75 Cat 1 AMA credits. Fee: $500/physicians, $300/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Oct. 23–25**

23rd annual San Diego postgraduate radiology review course, sponsored by the University of California, San Diego, School of Medicine, at the Hotel Del Coronado, San Diego, California. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Oct. 26–30**

2nd annual intensive review of neuro, head, and neck radiology, sponsored by the University of California, Irvine, at the Four Seasons Resort Hotel, Newport Beach, California. Credits: 28 Cat 1 AMA credits. Fee: $725/physicians, $450/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Oct. 29–Nov. 1**

3rd annual fingers to toes: comprehensive orthopaedic review course for primary care physicians, sponsored by the Office of Continuing Medical Education, Washington University School of Medicine, St. Louis, Missouri. Info: 314-362-6891 or 1-800-325-9862, fax: 314-362-1087, email: cme@msnotes.wustl.edu. **Oct. 30–31**

Breast imaging and interventions update, sponsored by the University of California, San Diego, at the Hotel Del Coronado, San Diego, California. Credits: 15 Cat 1 AMA credits. Fee: $450/physicians, $275/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Oct. 30–Nov. 1**

Breast imaging today and tomorrow, sponsored by the International Institute for Continuing Medical Education, at the Ritz Carlton Resort Hotel, Naples, Florida. Credits: 26 Cat 1 AMA credits. Fee: $650/physicians, $450/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Nov. 2–5**

MARCOM II, second annual mid-atlantic regional conference on occupational medicine, sponsored by the Office of Continuing Medical Education, Virginia Commonwealth University, Medical College of Virginia Campus, at the Williamsburg Hospitality House, Williamsburg, Virginia. Info: Nancie Mervis, 1-800-413-2872 or 804-828-8640, fax: 804-828-7438. **Nov. 13–15**

The impact of technology on consultation-liaison psychiatry, sponsored by the Academy of Psychosomatic Medicine, at the Buena Vista Hotel, Buena Vista, Florida. Info: 773-784-2025, fax: 773-784-1304, email: apsychmed@aol.com. **Nov. 19–22**

4th annual sports medicine for the primary care physician, sponsored by the Office of Continuing Medical Education, Virginia Commonwealth University, Medical College of Virginia Campus, at the Williamsburg Hospitality House, Williamsburg, Virginia. Info: Nancie Mervis, 1-800-413-2872 or 804-828-8640, fax: 804-828-7438. **Dec. 4–6**

Contemporary management of acute myocardial infarction, sponsored by the Office of Continuing Medical Education, Washington University School of Medicine, St. Louis, Missouri. Info: 314-362-6891 or 1-800-325-9862, fax: 314-362-1087, email: cme@msnotes.wustl.edu. **Dec. 12**

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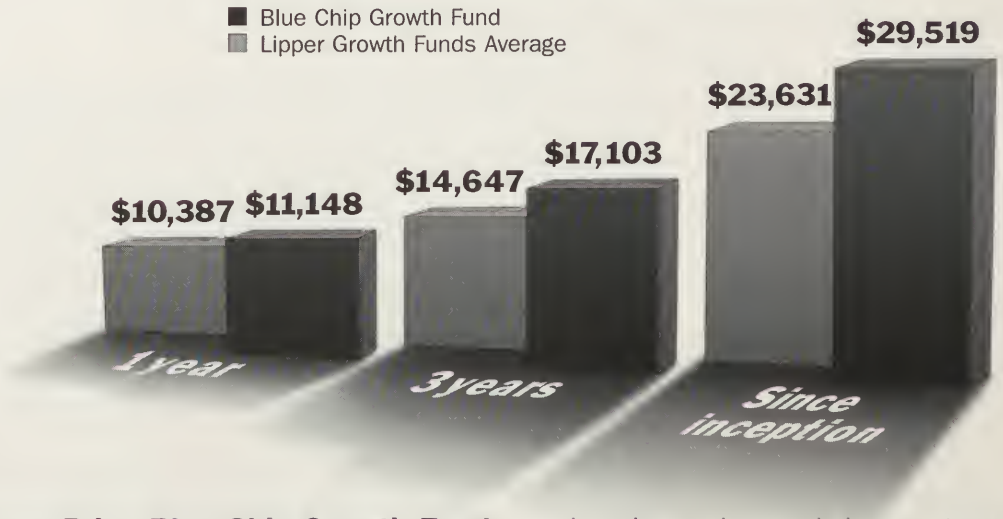

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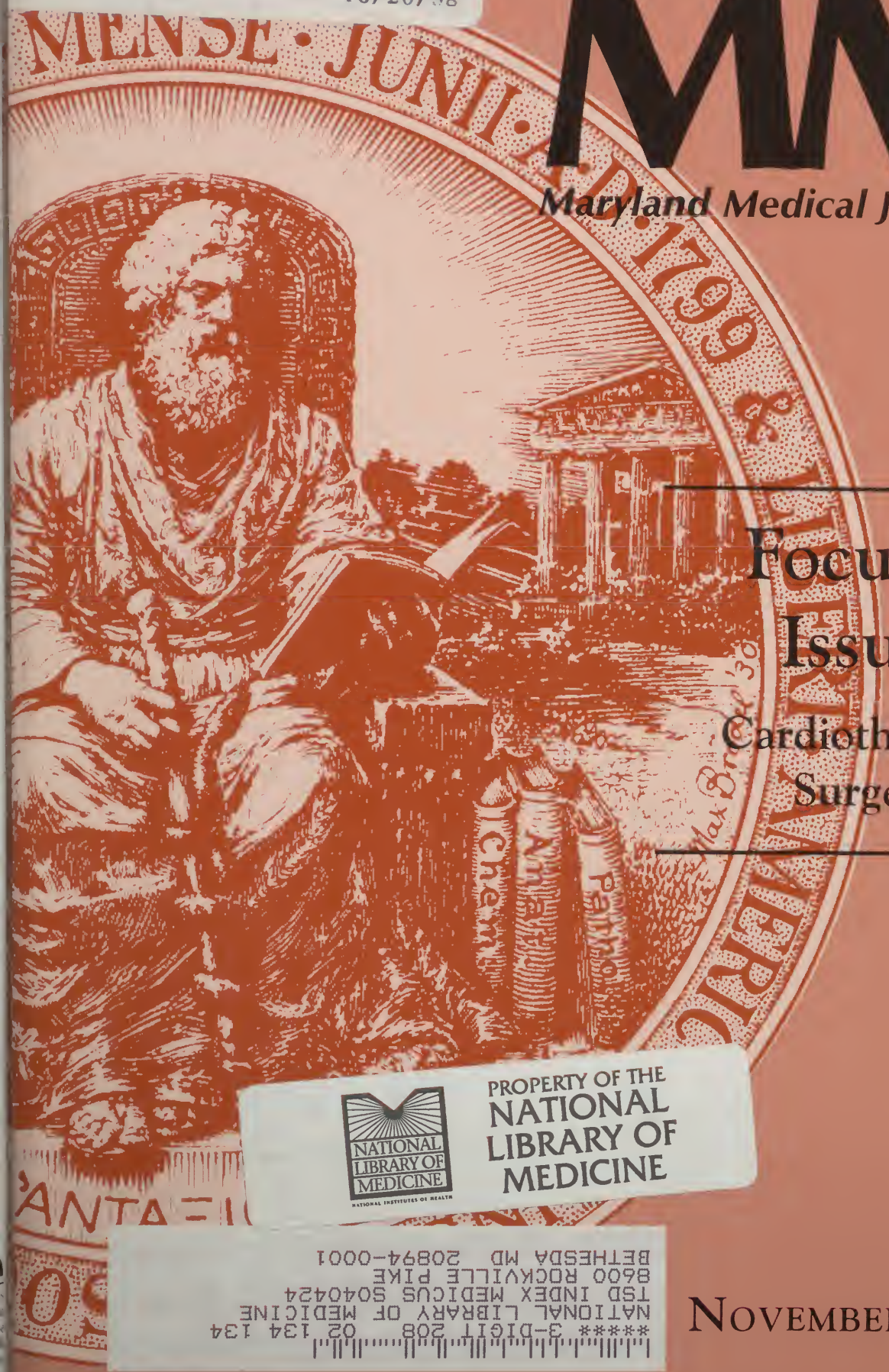

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From the Editor's Desk

Introduction: current topics in cardiothoracic surgery

We are pleased to present this focused issue dedicated to the latest developments in cardiothoracic surgery. It is especially gratifying to have one of our own — an international leader in the field — as our guest editor.

Dr. Safuh Attar is professor emeritus in the division of thoracic and cardiovascular surgery at the University of Maryland School of Medicine, and has been associated with the University since 1957. He has authored over 200 scientific papers, contributed to seven books, and has been the recipient of five grants. He is an eagerly sought speaker, having addressed nearly every medical and hospital group in this state as well as medical gatherings in many other states. Beyond our borders he has addressed medical groups in Canada, China, Saudi Arabia, Holland, Italy, Brazil, and Lebanon. A book he authored, Hemostasis in Cardiac Surgery, *is soon to be published.*

We are also proud to report that Dr. Attar has been an active member of our editorial board for a number of years.

Marion Friedman, M.D.
EDITOR

Significant advances in cardiothoracic surgery have been made over the past 50 years. Most notably, these include the development of cardiopulmonary bypass, which made open-heart surgery possible in newborns as well as in adults; surgery on aortic aneurysms; valve surgery; coronary artery bypass surgery; the development of heart, lung, and heart and lung transplantations; heart assist devices; and the total artificial heart. There have also been advances in the management of emphysema and lung cancer.

In this issue of the *Maryland Medical Journal*, key topics in cardiothoracic surgery are presented. Dr. Cardarelli discusses closed and open-heart surgery in newborns as well as in infants. Dr. Conte reviews the current status of heart, lung, and heart and lung transplantations. These procedures are no longer experimental, but constitute an integral part of the management of selected patients with end-stage heart and lung disease. He discusses the alternatives to heart transplantation and the promising potential for the use of heart assist devices for congestive heart failure. Dr. Foster reviews the pathophysiology of coronary artery disease and the options for therapy, including the recent application of transmyocardial revascularization, which is still in the investigative stage. Dr. Fonger reviews the recent development of minimally invasive approaches to cardiac surgery and its application in selected patients. Dr. Gott gives the historical background of Antoine Marfan and the evolution of the current surgical treatment of Marfan disease, as well as a synopsis of the genetic picture in Marfan families.

A very important and current topic summarizes the work of a pioneer Baltimore surgeon, Dr. Otto C. Brantigan, on lung volume reduction surgery for emphysema and its current status.

Another new innovation in thoracic surgery, presented by Dr. Sonett, is the use of endobronchial stents in the management of patients with malignant, benign, and lung transplantation airway complications.

We hope this issue brings to Maryland physicians a glimpse of the current topics being actively discussed and applied in cardiothoracic surgery.

Safuh Attar, M.D.
GUEST EDITOR
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Neonatal cardiac surgery

Marcelo G. Cardarelli, M.D., and Richard Ringel, M.D.

From the divisions of thoracic surgery and pediatric cardiology, University of Maryland Medical System, where Dr. Cardarelli is assistant professor of surgery, and director of pediatric cardiac surgery, and Dr. Ringel is professor or pediatrics, and director of the catheterization laboratory.

This article provides an overview of congenital heart disease (CHD), with emphasis on diagnosis and treatment during the first month of life. Heart malformations are relatively common birth defects, with vast repercussions in domains other than cardiac surgery, including family, society, and health care costs. Over the last 15 years, we have experienced a trend toward early diagnosis and intervention through interventional catheterization and surgery. This trend, despite some initial resistance, has established itself as the right approach toward the management of CHD. Moreover, every year, new studies demonstrate the feasibility of open heart surgery in low and very low birth weight neonates (<2,500 and <1,500 grams, respectively). Ongoing research promises to deliver procedures of palliative or reparative fetal heart surgery during the first decade of the 21st century. Within this complex and ever-changing scenario, we focus on a series of clinical entities, granted early intervention, and the lifetime expectations for the patients and their families.

Frequency of congenital heart disease

Several epidemiological studies have been published, and in most of them the reported prevalence of CHD among newborns is similar. Perhaps the most important study for the residents of Maryland is the Baltimore-Washington Infant Study, 1981-1989. According to this study, the prevalence of CHD is 4.9 per 1,000 live births. That would account for close to 350 babies born with CHD in Maryland every year.[1]

Critical congenital heart disease

Not everyone born with CHD requires immediate treatment. Critical congenital heart disease encompasses all those who need catheterization and/or surgery during the first year of life, about 10% of babies born with

these defects. Catheterization can be performed for diagnosis when other noninvasive methods fail, or as an intervention in itself.[2]

Indications for interventional catheterization in neonates and infants

Interventional catheterization got its start in 1965 when the first Rashkind procedure was performed. This procedure, also known as balloon atrial septostomy, ushered in the era of correction for complex congenital heart defects and represented the first attempt to use catheterization techniques to palliate or correct cardiovascular abnormalities.

Interventional techniques can be applied to newborns beginning on the first day of life to either avoid the need for open heart surgery or, more commonly, to work in concert with the surgeons to achieve better palliation or repair of complex disease. Balloon atrial septostomy is still widely used around the world to allow adequate mixing of systemic and pulmonary venous blood to partially relieve the profound cyanosis experienced by infants born with complete transposition of the great arteries. In past years, this technique would allow enough arterial oxygenation for infants to survive 3 to 6 months, at which time an atrial baffling surgery (the Mustard or Senning procedure) could be performed to separate the two blood streams and allow normal arterial oxygen saturation. Now, total repair of transposition of the great arteries via the arterial switch procedure allows for a complete anatomical repair in the first week of life. However, it has been demonstrated that infants tolerate the surgery better and do better neurodevelopmentally if they have had an atrial septostomy before an arterial switch procedure.

In the past, infants born with critical pulmonary valve stenosis would require open heart surgery to incise a bicuspid or effused pulmonary valve and allow blood flow into the lungs. In 1976, balloon angioplasty techniques were applied to older children with pulmonary valve stenosis and it wasn't long thereafter that the technique was miniaturized for use in neonates who have critical narrowing of their pulmonary valves. This relatively low-risk catheterization procedure is effective in 85% of neonates, who thereafter no longer require any other interventional procedures. Once it was recognized that balloon valvotomy techniques could be applied to infants as small as 2 to 3 kg, interest turned to applying the technique to neonates with critical aortic valve stenosis. This congenital anomaly carried a mortality rate as high as 25% because of the severe strain placed on the left ventricle and the severely reduced cardiac output being supplied to the child. Although it remains the highest risk pediatric interventional procedure, good results are being obtained by balloon aortic valvotomy. This technique is a prime example of how interventional cardiology compliments surgical repair of congenital heart lesions. The balloon valvotomy will often allow for stabilization, weight gain, and growth in critically ill infants who then become better candidates for definitive surgical palliation either later in infancy, or sometimes many years later.

Interventional catheterization techniques are also being used after open heart surgical repairs of complex congenital heart defects to further improve upon a patient's surgical palliation by addressing problems beyond the reach of the surgeon's knife. For example, tetralogy of Fallot and other related congenital heart defects can be associated with stenosis in the peripheral pulmonary arteries. Such stenoses cannot be enlarged at the time of surgical repair because of their inaccessibility to the surgeon. Thus, some patients who have had a repair of their defect will experience persistent pulmonary artery hypertension or diminished blood flow to either the right or left lung. Using metallic endovascular stents delivered on balloon angioplasty catheters, cardiologists can improve blood flow to the lungs and reduce the pulmonary arterial and right ventricular pressures to attain a more favorable long-term outcome for the child. Although not currently applicable to the infant, a nonsurgical closure of the atrial septal defect (ASD) is on the horizon. ASDs are problems usually recognized in late infancy or early childhood, but do not present as clinical problems until the adult years. Nevertheless, it is generally recommended to close such defects by the age of 3 to 5 years.

An open heart surgical procedure is required to perform a simple patch or suture closure of the opening in the atrial septum. There are currently four devices in FDA-sponsored trials that can be delivered on the end of a catheter and provide closure of such defects by sandwiching the atrial septum between two umbrella-like disks that are detachable from the catheter and, thus, can be implanted to occlude septal opening.

Interventional catheterization is improving the outcome of children born with a wide variety of CHDs by either reducing the need for open heart surgical procedures, or by complementing such surgery to achieve a better long-term outcome.

Cardiac surgery in the neonatal period

Patients with the following conditions have in common the need for open heart surgery during the neonatal period, with a natural history of rapid deterioration and death if left untreated: transposition of the great arteries (TGA), hypoplastic left heart syndrome (HLHS), total anomalous pulmo-

nary venous connection (TAPVC), and other forms of left ventricular outflow tract obstruction (LVOTO).

There is a second group of patients, sometimes not as ill as the previous one, who will also require surgery, although not open heart procedures. They can be divided in two subgroups:

A. Curative closed procedures
   - Patent ductus arteriosus
   - Coarctation of the aorta

B. Palliative closed procedures
   - Shunts (patients with severe pulmonary stenosis or atresia)
   - Pulmonary artery band (patients with pulmonary overcirculation)

Open heart procedures

Transposition of the great arteries. Transposition of the great arteries (TGA) is one of the most common critical heart defects, probably close to one case for every 4,500 babies born alive. The malformation consists of the wrongful connection of the pulmonary artery to the left ventricle and the aorta to the right ventricle; therefore, both circulations run in parallel and not in series as normal. Cyanosis is the main symptom and unless mixing among the systemic and pulmonary circulation is increased, or the defect repaired surgically, death is likely. About 25% of these patients also present a ventricular septal defect, the main symptom being CHF and not cyanosis, with a less urgent need for surgery during the neonatal period.

The natural history of the disease tells us that out of 100 babies born with this defect, 55 will be alive one month later, and only 15 will survive to six months of age. It is estimated that about 85% of babies born with TGA have two normal ventricles, two atrioventricular valves, and two great vessels, making them the main beneficiary of proper diagnosis and prompt surgical treatment.

- **Medical management and surgical treatment.** Upon diagnosis, measures are directed to rapidly establish connections between systemic and pulmonary circulation. The easiest is to institute a prostaglandin E1 drip in order to keep blood flow through the ductus arteriosus. The more invasive method is to create an atrial communication by means of a balloon septostomy (see indications for interventional catheterization, pg. 231). Both measures are of immense value in keeping the patient hemodynamically stable until surgery.

  The evolution of surgery for TGA is a mirror of the changes across the board in the field of open heart surgery. It began in the late 1950s and early 1960s when atrial switch operations (Mustard and Senning operations) attained successful physiological reconstruction. Its paramount was achieved in the mid-1970s when Dr. Jatene, in Brazil, performed the first successful arterial switch operation, with reanastomosis of the great vessels to the proper ventricle and translocation of the coronary arteries to the neo-aorta. Today, surgical mortality for TGA is close to 5%, with a late mortality close to 2%. Late morbidity for the arterial switch operation involves a small percentage of supravalvar pulmonary stenoses, aortic insufficiencies, and coronary obstructions.

Hypoplastic left heart syndrome (HLHS). Hypoplastic left heart syndrome is the fourth most common CHD, with a prevalence of 7.5% of babies born with heart defects, and responsible for 25% of all deaths in the first week of life. The diagnosis of HLHS encompasses a spectrum of entities. All have in common smallness of the left side cavities and ascending aorta, with a variable combination of different degrees of mitral stenosis/atresia and aortic stenosis/atresia, and the certainty of death if left untreated.

The diagnosis is echocardiographic, and can be expected to be accurate as early as the 16th week of pregnancy. According to the Baltimore-Washington Infant Study, there has been a decrease in the prevalence of this particular malformation, probably due, at least in part, to early detection and termination of the pregnancy.

- **Medical management and surgical treatment.** Patients born with HLHS present with severe acidosis; immediate recognition and institution of prostaglandin (PGE1) to maintain blood flow from the only ventricle to the aorta, neck vessels, and coronaries is of uttermost importance.

  The surgical treatment consists of a series of major interventions, staged over time. Stage 1, the Norwood operation, embodies taking down the ductus arteriosus, enlargement of the aortic arch and ascending aorta with the use of homograft, and connecting the outlet of the right ventricle to this new aorta. As a consequence, flow to the branches of the pulmonary arteries is reinstituted by the creation of a systemic to pulmonary shunt.

  Subsequent stages are based on the principle of establishing blood flow through the pulmonary circuit, not by a pumping system, but by gradient. Stage 2, undertaken within six months to one year, has been modified and received different names, among them, bi-directional Glenn anastomosis, or Hemi-Fontan. Regardless of the denomination, the principle is the same; take-down of the systemic

to pulmonary shunt and creation of an anastomosis between superior vena cava and the pulmonary artery. The final stage, performed 6 months to 1 year after the second, is the complete anastomosis of all the systemic venous return to the pulmonary artery. Mortality for this severe malformation is still important, ranging from 25% to 45% for stage 1, and close to 5% for each of the following stages.

Less severe forms of hypoplastic heart include a whole set of entities, not extremely common, but severe enough that they require treatment early in life. They present different degrees of aortic stenosis, pure or associated with anomalies of the aortic arch or coarctation of the aorta. They can also be accompanied by mild malformations of the left ventricle, ventricular septal defects, and mitral stenosis. Intervention is decided on a case-by-case basis. While some will benefit from interventional catheterization, others will need a more complex surgical approach. Mortality as well as morbidity is lower than for HLHS, but is still important, with an important number of patients developing late stenosis of the aortic arch or recoarctation.

Total anomalous pulmonary venous connection. Total anomalous pulmonary venous connection (TAPVC) is a very uncommon malformation (less than 1%), but when present in a neonate, represents the only truly emergency situation in congenital heart surgery. Tachypnea and cyanosis are always present, since the defect consists of a lack of connection between the pulmonary veins and the left atrium.

There are three different types of connections. Supracardiac is the most common, with the lowest mortality. Veins are drained in most cases through a vertical vein into the ignominate vein or the superior cava. In the intra-cardiac type the pulmonary veins drain into the coronary sinus. In the infra-cardiac type, the least common, the veins direct their flow to the inferior cava or portal system. It is rapidly occlusive and presents the highest mortality. Natural history of the unattended disease is poor, with a 50% mortality at three months and 80% mortality within a year.

Surgical management consists of the anastomosis of the pulmonary veins to the left atrium, as well as the closure of the atrial septal defect. Mortality for this procedure varies depending on the type of anomaly, as well as the presence of associated lessons; but overall mortality is close to 16%. A long-term main concern is the stenosis of the anastomosis between veins and left atrium, and for that reason absorbable sutures are used.

Non-open heart procedures (curative)

Coarctation of the aorta. Coarctation of the aorta is one of the most common surgeries for congenital heart defects during the neonatal period. The coarctation is present at birth, but becomes apparent only when the ductus arteriosus begins to close. Many patients are discharged every year from well-baby nurseries, only to show up in the emergency room or the pediatrician's office in severe heart failure and acidosis.

As in other cases of poor aortic perfusion, maintenance of a patent ductus is the first step to stabilize the patient for surgery; acidosis must be corrected before any attempt at surgical correction can be made.

- **Surgical treatment.** Surgical repair can be accomplished by different techniques, all with good results. Resection of the coarctate segment and end-to-end anastomosis and subclavian flap repair are the most commonly used in newborns. Mortality is dependent on age and weight; it is as high as 15% in neonates under 2.5 kg, or in patients with coexisting complex cardiac malformations, and as low as 2.5% in those with isolated coarctation. Despite the type of repair chosen, there is a medium- and long-term incidence of restenosis at the site in the range of 10 %.

  Less severe cases may begin to show up gradients between upper- and lower-body arterial pressures at a later time in life. Surgery is usually performed in those older patients once the gradient is larger than 30 mm Hg to 40 mmHg, and before school age.

Patent ductus arteriosus. Although a common defect, presenting alone or in combination with other malformations, a patent ductus arteriosus (PDA) will rarely require treatment in the neonatal period. An important exemption is patients born prematurely, who become ventilator-dependent because of the presence of the ductus.

- **Medical management and surgical treatment.** Surgical closure of the PDA is the only alternative for premature babies who have failed medical attempts for closure. The standard medical therapy consists of up to three doses of indomethacin 0.2 mg/kg, intravenous, 12 hours apart, with care to monitor platelet count and renal function. Surgery, on the other hand, is approached in the regular fashion, except it can be performed in the neonatal intensive care unit and that ligation with surgical clips is usually preferred over traditional sutures in order to minimize manipulation. Results are excellent, with very low mortality and rapid respiratory improvement.

Palliative surgery in neonates: Systemic to pulmonary anastomosis

Little over 50 years ago, Drs. Blalock and Taussig developed the first shunt operations for blue babies, opening the door to a series of variations in shunt anastomosis for a different number of clinical entities, all of which have in common the presence of severely decreased pulmonary blood flow (e.g., tetralogy of Fallot, tricuspid atresia, single ventricle with pulmonary stenosis or atresia).

Originally, the shunt operation was designed to be done using the patient's own subclavian artery. Subsequently, with the development of new materials, the classic Blalock-Taussig shunt has been replaced by the modified version, using synthetic conduits on either side of the aortic arch.

As with any palliative procedure, it is short lived and a more definitive treatment has to be performed to ensure a normal life. Several advantages of the shunt operation are that it allows time for patients to gain weight and for the pulmonary resistance to drop, therefore improving the chances of survival at the time of the reparative surgery. Mortality varies with age and weight, but is generally close to 15% when the shunt is performed in the first 30 days of life.

Discussion

According to data from the Pediatric Cardiac Care Consortium (1984-1995),[3] a group of over 35 centers with pediatric cardiac surgery services, the operative mortality for neonates with CHD has been slowly improving. The average mortality for the 5,447 neonates undergoing surgery from 1984 to 1994 was 25.1%. Between January 1996 and July 1998, we have performed 72 consecutive surgical procedures on 56 neonates. Of these, 26 were open heart surgeries and 46 were closed (ductus, coarctation, pulmonary artery band, pacemaker). Mortality was three patients for open heart surgery (11.5%) and one closed case (2.1%). Our experience with low birth weight neonates (under 2.5 kg) has been rewarding, considering this group is at the highest risk. Out of 54 consecutive patients operated on between 1993 and 1998, 45 underwent a closed procedure (ductus and shunts) with a mortality of two patients (4.4%) and nine were open heart cases with a mortality of one patient (11.1%).

Finally, we share the notion that a team approach involving the primary care physician or the pediatrician, as well as the different disciplines (cardiologist, cardiac surgery, ICU) during the hospitalization, is the only way to minimize mortality and ensure a relatively normal quality of life for these patients and their families.

References

1. Boughman JA, Neill CA, Ferencz C, et al. The genetics of congential heart disease in perspectives in pediatric cardiology. In: Ferencz C, Rubin JD, Loffredo CA, Magee CA: Epidemiology of congenital heart disease: the Baltimore-Washington Infant Study 1981-1989. Vol. 4. Mount Kisco, NY:Futura Publishing Company, Inc.: 1993.
2. Castaneda A, Jonas RA, Mayer JE, Jr, Hanley FL. Cardiac surgery of the neonate and infant. Philadelphia: WB Saunders Company; 1994.
3. Moller JH, Dwan PF. Perspectives in pediatric cardiology: surgery of congenital heart disease, Pediatric Care Consortium 1984-1985, Vol. 6. Armonk, NY: Futura Publishing Company, Inc.; 1998. ■

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Thoracic transplantation in 1998

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ABSTRACT: *Thoracic transplantation has been a clinical option for patients with end-stage heart and lung disease for three decades. Heart, lung, and combined heart-lung transplantations are no longer experimental procedures; they are a standard part of the treatment algorithm for selected patients with end-stage heart and lung disease. This article summarizes the current status of heart, lung, and heart-lung transplantations and provides an insight into the future of this field.*

It is now 30 years since heart transplantation was established as a successful treatment for end-stage heart disease and 17 years since lung transplantation was established as a successful treatment of end-stage lung disease.[1,2] Since its introduction to clinical medicine, advances in heart and lung transplantation have occurred at such a rapid pace that these treatments are no longer considered experimental. The International Society for Heart and Lung Transplantation (ISHLT) reports an overall one-year survival rate of approximately 80% for heart transplantation and 70% for lung transplantation, with many programs achieving survival rates greater than 90%.[3] In 1996 there were 3,048 heart transplants performed worldwide at 297 programs, 998 lung transplants performed at 145 programs, and 76 combined heart-lung transplants performed at some of the 114 centers approved for the procedure.[3]

Heart transplantation

Indications. Heart transplantation is indicated for adult patients with NYHA (New York Heart Association) class III or IV heart failure who have

TABLE 1. Contraindications to heart transplantation.

- Systemic or multisystem disease
- Irreversible pulmonary hypertension (PVR > 6-8 Woods units)
- Significant renal disease (creatinine > 2.5mg/dl)
- Significant hepatic disease (total bilirubin > 2.5mg/dl)
- Significant peripheral vascular disease
- Significant pulmonary disease
- Diabetes mellitus
- Co-existing neoplasm
- Active infection
- Obesity of cachexia
- Drug or alcohol abuse
- Psychiatric illness
- Age greater than 65 years old
- Cigarette smoking

failed medical therapy and have no surgical options available to them. Transplantation is also indicated for patients with severe ischemia not amenable to coronary bypass surgery or angioplasty and patients with intractable ventricular tachyarrhythmias. Medically managed patients should receive maximal medical therapy before transplantation, including vasodilators, angiotensin converting enzyme inhibitors, digoxin, diuretics, and beta-blocking medications. Patients should be in otherwise good health, have a stable psychosocial profile, and have a strong family support system.

Most adult patients who undergo heart transplantation have a primary cardiomyopathy (51%) or an ischemic cardiomyopathy (40%) secondary to coronary artery disease, according to the ISHLT database. Additional indications include valvular disease (4%), retransplantation (2%), congenital heart disease (2%), and miscellaneous (1%). In the pediatric age group, congenital heart disease is the most common indication in children less than one year of age, with an increasing proportion of primary cardiomyopathies as the age of the patient increases.[3]

Contraindications to transplantation include active systemic or multisystem disease; severe hepatic, renal, or pulmonary dysfunction; significant cachexia or obesity; active drug, alcohol, or tobacco abuse; and incapacitating psychiatric illness. Age is not itself a contraindication, although each center has its own age guidelines. Patients from neonates to septuagenarians have been successfully transplanted. Significantly elevated pulmonary vascular resistance (>5-6 Woods units) is a relative contraindication because of the risk of acute right ventricular failure (**Table 1**).

Results

The current overall one- and four-year survival rates for adult heart transplantation are approximately 80% and 70%, respectively, compared to 70% and 55% before 1985. In the pediatric population the one- and four-year survival rates are 65% and 55%, respectively, in children less than one year, 71% and 65% in the one- to five-year-old group, and approach adult statistics in older children and teenagers.[3]

The long-term results of heart transplantation are encouraging. In one- and two-year follow-up of patients post-transplantation approximately 90% of recipients perform routine activities without assistance and 8% require little assistance in their activities of daily living. Up to 60% of patients return to work or retire able to work if they choose following transplantation.[3] Rejection- and infection-related issues are common in the first year resulting in 45% rejection- or infection-related problems. The percentage decreases to 26% in the second post-transplant year and continues to decrease thereafter.[3]

The most likely cause of death in transplant recipients within the first 30 days is nonspecific graft failure. This can occur as a result of right-heart failure secondary to an elevated pulmonary vascular resistance, poor preservation or prolonged ischemic times, acute rejection, technical complications, or unclear etiologies. Infection and acute rejection occur with equal frequency in the intervening period up to one year and cardiac allograft vasculopathy (a type of coronary artery disease) is the most frequent cause of death after one year.

Malignancy and rejection are common late causes of death. Recipient factors that increase the risk for one-year mortality in adult patients include repeat transplantation, preoperative ventilator dependence, mechanical or inotropic support, older age (>70 years), and nonwhite recipients. Transplant center factors that increase the risk of mortality include low volume programs and increased ischemic time. Identified risk factors from the donor include increasing age, female, and nonwhite donors.[3]

Lung transplantation

Indications. Lung transplantation (LT) remains the only viable option for most patients with end-stage lung disease. While not all patients are transplant candidates, a wide variety

TABLE 2. Indications for lung transplantation.

Obstructive lung disease
- α_1-Antitrypsin deficiency emphysema
- Idiopathic emphysema
- Chronic obstructive pulmonary disease

Restrictive lung disease
- Idiopathic pulmonary fibrosis
- Interstitial lung disease
  - Occupational lung disease
  - Chemotherapy or radiation therapy related
  - Sarcoidosis
  - Collagen-vascular disorders (with primary pulmonary involvement)
  - Histiocytosis X or eosinophilic granuloma
  - Lymphangioleiomyomatosis
  - Desquamative interstitial pneumonitis
  - Alveolar microlithiasis
  - Epithelial hemangioendothelioma
  - Others (known or unknown etiology)

Septic lung disease
- Cystic fibrosis
- Bronchiectasis

Pulmonary vascular disease
- Primary pulmonary hypertension
- Eisenmenger syndrome
- Thromboembolic pulmonary hypertension
- Veno-occlusive disease

Controversial
- Alveolar cell carcinoma
- Adult respiratory distress syndrome

of diseases that result in pulmonary failure can be treated by LT (**Table 2**). Each of these diseases has characteristics that impact the selection of which of the various transplant options is most appropriate for an individual patient.

The menu of possible lung transplant options includes single- and double-lung transplantation with or without intracardiac repair, lobar transplantation from living related or cadaveric donors, and combined heart-lung transplantation. While each program relies on its own experiences and preferences to select the appropriate procedure, most programs follow generally accepted operative indications (**Table 3**).

The evaluation for LT consists of extensive testing to establish the patient's overall medical condition, exclude identifiable contraindications, and establish which transplant procedure is the most appropriate for the patient (**Table 4**). Appropriate candidates for LT are determined using the same general candidate criteria that is used for cardiac transplantation, as well as organ- and disease-specific criteria. The timing of referral for LT varies by disease-specific criteria, the patient's rate of decline, and the projected wait on the LT waiting list (**Table 5**). Clearly established contraindications exist that are interpreted as relative or absolute by the individual programs (**Table 6**).

Data from the ISHLT show that for single-lung transplantation the most common indication is emphysema (44%), followed by idiopathic pulmonary fibrosis (20%), α_1-Antitrypsin deficiency (12%), primary pulmonary hypertension (6%), and miscellaneous causes including retransplantation (18%). For double-lung transplantation the most common indication is cystic fibrosis (34%), emphysema (18%), α_1-Antitrypsin deficiency (11%), primary pulmonary hypertension (11%), idiopathic pulmonary fibrosis (7%), and miscellaneous causes including retransplantation (20%).[3] Some of these miscellaneous indications include collagen vascular diseases, sarcoidosis, leiomyomatosis, industrial or medically induced pulmonary fibrosis, and bronchiectasis.

Combined heart-lung transplantation (HLT), while used for many indications in the past, is generally reserved for patients

TABLE 3. Choice of procedure in lung transplantation.

Single lung transplantation
- Interstitial lung diseases
  - Idiopathic pulmonary fibrosis
  - Lymphangioleiomyomatosis
  - Lymphocytic interstitial pneumonitis
- Obstructive airway diseases
  - emphysema
  - α_1-Antitrypsin deficiency
- Primary pulmonary hypertension (PAP < 2/3 systemic)
- Eisenmenger syndrome with concomitant repair of ASD, VSD, PDA, etc.

Bilateral single lung transplantation
- Septic lung diseases
  - Cystic fibrosis
  - Bronchiectasis
- Obstructive airway disease in patients under 50 years of age (controversial)
- Pulmonary hypertension (PAP > 2/3 systemic)

Heart-lung transplantation
- Eisenmenger syndrome with complex intracardiac anatomy
- Primary pulmonary hypertension with severe clinical right heart failure
- Concomitant end-stage lung and heart disease
- Age 55 years or younger

TABLE 4. Transplant evaluation testing

- Medical history and physical examination
- Chest radiograph, electrocardiogram, and routine blood tests
- Other laboratory tests
  - ABO blood type
  - HLA type and panel of reactive antibodies (PRA)
  - Serologic tests for hepatitis A, B and C; human immunodeficiency virus; cytomegalovirus
- Pulmonary studies
  - Standard pulmonary function tests and arterial blood gases
  - Quantitative ventilation-perfusion lung scan
  - CT of chest
  - Cardiopulmonary exercise test
- Cardiovascular studies
  - Radionuclide ventriculography/stress test
  - Right-heart catheterization
  - Left-heart catheterization with coronary angiography*
  - Transesophageal echocardiography*
- Rehabilitation assessment
  - Six-minute walk test
  - Determination of supplemental oxygen requirements (rest and exercise)
- Psychosocial evaluation
- Nutritional assessment
- Additional appropriate studies to determine the status of any other medical problems

* *In selected patients as indicated*

with irreversible cardiac dysfunction, who are not candidates for single- or double-lung transplantation in combination with an intracardiac repair. The ISHLT database shows that the most common indications for HLT are congenital heart disease (30%), primary pulmonary hypertension (27%), and cystic fibrosis (16%). Other indications include emphysema (4%), idiopathic pulmonary fibrosis (3%), retransplantation (3%), α_1-Antitrypsin deficiency (2%), and miscellaneous causes (15%).

Results

The current one- and five-year survival for all LT since 1988 is approximately 70% and 40%, respectively, according to the ISHLT database. The numbers are approximately equal for single- and double-lung transplant procedures and since 1994 the overall one-year survival is approximately 75%. For HLT the one- and five-year survivals are 60% and 40%, respectively. There are survival differences based on the patient's pretransplant diagnoses. For single-lung transplantation, patients with a diagnosis of emphysema and idiopathic pulmonary fibrosis have one-year survivals approaching 80%, while those with a diagnosis of primary pulmonary hypertension and α_1-Antitrypsin deficiency are closer to 60% in the ISHLT database. Differences in survival are less clear in double-lung transplantation; however, patients with emphysema and α_1-Antitrypsin deficiency seem to do better than the diagnoses where pulmonary hypertension is a component of the pathophysiology.[3]

The functional improvement in lung transplant recipients is impressive. At one-year post-transplant 80% of surviving recipients have no limitations of activity, 15% require some assistance, and 5% require total assistance. By two years following transplant, 86% of survivors require no assistance, 13% require some, and 1% require total assistance. Return to work statistics show that by one-year post-transplant 77% of patients are either working or retired, and at two years this percentage is relatively stable at 70%. Post-transplant hospitalization occurs in 64% of surviving patients in the first year and 52% in the second year. Most of these admissions are rejection- or infection-related and only 7% are due to nonrelated issues.[3]

The causes of death in lung transplant recipients are often multifactorial and difficult to specify. In the first 30 days post-transplant, nonspecific graft failure is the most often cited cause of death. This is often a combination of infection, reperfusion pulmonary injury, rejection, and volume overload. Infection is the most commonly reported etiology in the period between 31 days and one-year post-transplant and obliterative bronchiolitis is the most common cause cited after one year. Recipient factors identified as risk factors for one-year mortality include a diagnosis of congenital heart disease or primary pulmonary hypertension, ventilator dependence, prior transplantation, hospitalization or in an ICU pre-transplantation, and age greater than 70.[3] None of these factors are surprising given that these patients tend to be sicker, often with multisystem involvement in the case of congenital heart disease and primary pulmonary hypertension, require cardiopulmonary bypass, and are more prone to infections.

Future considerations

Immunosuppression remains the most difficult management issue for transplant recipients and practitioners alike. It is one of the fields where a great deal of money, effort, and hope has been placed to improve the quality of life for transplant recipients. Since the introduction of cyclosporine

TABLE 5. Guidelines for timing referral for lung transplantation

Obstructive lung diseases
- Postbronchodilator FEV_1 <30% predicted
- Resting hypoxia (PO_2 < 55-60 mmHg)
- Hypercapnia
- Significant secondary pulmonary hypertension

Cystic fibrosis
- Postbronchodilator FEV_1 <30% predicted
- Resting hypoxia (PO_2 < 55 mmHg)
- Hypercapnia

Idiopathic pulmonary fibrosis
- VC, TLC < 60% predicted
- Resting hypoxia
- Significant secondary pulmonary hypertension

Primary pulmonary hypertension
- NYHA class III or IV
- Mean right atrial pressure ≥ 10 mm Hg
- Mean pulmonary artery pressure ≥ 50 mm Hg
- Cardiac index ≤ 2.5 L/min/m^2

in the 1980s, the aim has been to bring to clinical use more specific immunosuppressive agents with fewer side effects. There is a vast and ever-changing array of novel new immunosuppressive agents being investigated for clinical use. tacrolimus (FK506), mycophenolate mofetil (Cellcept), and rapamycin (Sirolimus) are a few of the new agents that may soon replace or change the standard triple immunosuppression therapy that has been the regimen of most transplant recipients since the 1980s (i.e., cyclosporine, azathioprine, and steroids). The new agents have completed or are currently in clinical trials.

Several potential treatments may provide alternatives to cadaveric transplantation for patients with end-stage heart disease. Xenotransplantation has been discussed as a possible alternative to cadaveric cardiac transplantation for several decades especially since the well-publicized Baby Fae baboon-to-human transplant in 1985.[6] Although significant progress has been made toward overcoming the complex immunological hurdles in xenotransplantation, clinical xenotrans-plantation is not yet ready to be introduced, although several groups are moving steadily in that direction.

Dynamic cardiomyoplasty, using skeletal muscle from a variety of sources, was the subject of a phase II clinical trial published in 1994. This technique demonstrated a one-year survival of 68% in patients with NYHA class IV heart failure.[7] The major causes of death were arrhythmias and progressive congestive heart failure. Despite improvements in functional status and quality of life in some patients, no measurable hemodynamic benefits have been noted. Variations in the surgical technique of cardiomyoplasty or aortomyoplastic techniques may improve the chances of making skeletal muscle assist procedures clinically useful.

Probably the most promising of all the potential therapies for congestive heart failure is the use of mechanical assist devices. While most people remember the media attention surrounding use of the Jarvik total artificial heart in the 1980s, the most likely devices to be used as long-term alternatives to heart transplantation are left ventricular assist devices (LVAD).[8] Several LVADs have been shown to be effective as a bridge to transplantation and have received or are expected to receive FDA approval for clinical use. For over two years, several LVADs have been in place in patients unable to receive a heart transplant and have allowed these patients to return home and lead nearly unrestricted lives with normal cardiac function. Current and future studies will compare LVADs to medical management and heart transplantation and review the efficacy and cost of each treatment.

For patients with obstructive lung diseases, lung volume reduction surgery (LVRS), which was reintroduced in 1994,

TABLE 6. Contraindications to lung and heart-lung transplantation.

Contraindication	Lung	Heart-lung
Absolute		
• Current cigarette smoking or substance abuse	Yes	Yes
• History of medical noncompliance	Yes	Yes
• Active malignancy or infection	Yes	Yes
Disease		
• Systemic extrathoracic organ dysfunction (kidneys, liver, CNS)	Yes	Yes
• Significant coronary artery disease	Yes	No
Relative		
• Major prior sternotomy or thoracotomy	No	No
• Severe right ventricular compromise (with overt right heart failure)	Yes	No
• Systemic steroid therapy >20 mg every other day	Yes	Yes
• Mechanical ventilation	Yes	Yes

appears to offer hope as an alternative or a bridge to LT.[4] A seven-year NIH sponsored nationwide multicenter trial is currently in progress to better characterize the indications, standardize the surgical techniques, clarify the physiological benefits, and identify the patients most likely to benefit from this procedure. For patients with primary pulmonary hypertension, prostacyclin (PGI_2) has been shown to be an effective agent to improve survival and has been used as a bridge to or an alternative to LT.[5] Future plans include using PGI_2 for secondary causes of pulmonary hypertension.

By far the greatest problem facing the fields of heart and lung transplantation is the shortage of transplantable organs. While the number of patients awaiting transplantation has continued to grow yearly since the mid-1980s, the number of donors has plateaued in the 1990s. The results are longer waiting times and a broadening of acceptable donor criteria including increased use of marginal and older donors.[3]

Donor awareness programs are being implemented nationwide to educate both medical and lay people in the hopes of increasing organ donation. These efforts, in conjunction with efforts to improve organ preservation, hold the greatest hopes to increase the numbers of transplantable organs in the future.

Conclusion

Heart, lung, and combined heart-lung transplantation have left the realm of experimental therapies and have become standard therapies for end-stage heart and lung disease. Steady improvements in survival have given hope to countless patients who have exhausted standard medical and surgical therapies. While innovative strategies are being developed as alternatives to transplantation, the greatest hope for patients currently on transplant waiting lists is increasing organ donation by donor awareness and other educational programs.

References

1. Barnard CN. The operation. A human cardiac transplant: an interim report of a successful operation performed at Groote Schuur Hospital, Capetown. *S Afr Med J* 1967;41:1271–1274.
2. Reitz BA, Wallwork JL, Hunt SA, et al. Heart-lung transplantation: successful therapy for patients with pulmonary vascular disease. *N Engl J Med* 1982;306:557–564.
3. Hosenpud JD, Bennett LE, Keck BK, et al. The Registry of the International Society for Heart and Lung Transplantation: fourteenth official report—1997. *J Heart Lung Transplant* 1997;16:691–712.
4. Cooper JD, Trulock EP, Triantafillou AN, et al. Bilateral pneumonectomy (volume reduction) for chronic obstructive pulmonary disease. *J Thorac Cardiovasc Surg* 1995;109:106–116.
5. Conte JV, Gaine SP, Orens JB, et al. Continuous intravenous prostacyclin as a bridge to lung transplantation. *J Heart Lung Transplant* 1998; in press.
6. Bailey LL, Nehlsen-Cannarella SL, Concepcion W, et al. Baboon-to-human cardiac xenotransplantation in a neonate. *JAMA* 1985;254:3321–3329.
7. Furnary AP, Moreira LFP, Jessup M, and the American Cardiomyoplasty Group. Dynamic cardiomyoplasty improves systolic ventricular function. *Circulation* 1994;90:I-309.
8. DeVries WC, Anderson JL, Joyce LD, et al. Clinical use of the total artificial heart. *N Engl J Med* 1984;310:273–278. ■

Management of coronary artery disease including transmyocardial laser revascularization

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Coronary artery disease is the leading cause of both death and severe disability in the United States. Anginal pain afflicts 6.75 million Americans,[1] limiting their physical activity and diminishing their quality of life. The number of Americans who will suffer from anginal pain will only increase in the next few decades as the baby boomer generation ages. Angina exacts a huge personal and financial toll upon the patient and the health care system. Patients are no longer able to partake in social, recreational, and occupational activities. Those with refractory angina make frequent hospital visits and are hospitalized for recurrent angina. Angina patients consume an inordinate amount of the health care dollar and achieve a less than optimal quality of life.

Many of those who suffer from angina remain crippled because they are not able to undergo surgical procedures, the revascularization is incomplete, or further disease occurs in the coronary vasculature and bypass grafts. Vast improvements in interventional cardiology and cardiovascular surgical procedures have occurred in the last few years.

Percutaneous transluminal coronary angioplasty (PTCA) and coronary artery bypass graft (CABG) are major therapies in controlling anginal pain. These procedures are costly, risky, and do not always obtain positive results. Often times these procedures need to be repeated. PTCA and CABG are not applicable for all angina, because some occlusions are surgically inaccessible.

Transmyocardial laser revascularization (TMR) is a relatively new procedure based on an old idea. TMR utilizes a finely focused laser to make holes in the heart myocardium to restore blood flow to ischemic heart myocardium. This article examines the pathophysiology of coronary artery disease, discusses the relative efficacy of current medical and surgical therapies, and reviews the current literature on the effectiveness of TMR as a procedure to diminish anginal pain.

Pathophysiology of coronary artery disease

Atherosclerotic plaques start forming in childhood as microscopic accumulations of cholesterol-containing lipoproteins. These lesions form in the tunica intima of elastic and muscular arteries and are related to the proliferation of intimal smooth muscle cells and the accumulation of lipid. Several hypotheses have been proposed.[2]

The true pathophysiology of atherosclerotic plaques is probably a combination of these hypotheses. Lipid accumulations occur in the macrophage cells (then called foam cells) located in the intima layer of the artery, and may be classified as Type I lesions. Type I lesions eventually grow into "fatty streaks" that are visible with the naked eye. The presence of fatty streaks defines the Type II lesion. Further lipid accumulation occurs, causing fatty streaks to develop into atheromas (Type III lesions). The atheroma is a necrotic mass of lipid that forms in the middle part of the atherosclerotic lesion. It is associated with the breakdown of the lipid-containing foam cells. This process allows for the escape of the stored lipid material to the extracellular space. The lipid then becomes confluent, leading to the formation of Type IV lesions. The final stage, Type V lesions, occurs when a thick layer of fibrous connective tissue or fibrous cap forms on the lumenal aspect of the atherosclerotic plaques.

There are many complications associated with atherosclerosis, which vary with location and size of the lesion, but can range from acute occlusion, chronic narrowing, aneurysm formation, and embolism.

Angina pectoris

One of the most common complications of atherosclerosis is angina, which is often directly related to progressive chronic narrowing of the vascular lumen. At 70% artery occlusion,[3] downstream myocardium becomes ischemic because the downstream vessels can no longer dilate enough to allow proper oxygen flow to the myocardium. Although the heart myocardium is ischemic, the patient may still be asymptomatic. Often at this stage the patient suffers from exertional chest pain or angina. This pain accompanies physical activities and is relieved by rest; it is usually classified as being Class I or II, as defined by the Canadian Cardiovascular Society (CCS). Class I and II angina usually require a limitation of activity on the part of the patient, which may require reduction in occupational and social activities. When the coronary artery lumen has become 80% occluded,[3] suffering from angina occurs with minimal activity (Class III), and sometimes during periods of rest (Class III or IV angina). These severe symptoms often lead to a serious degradation in livelihood, and may progress to enforced bed rest. These symptoms are all associated with coronary artery disease and define the condition known as stable angina.

Unstable angina is characterized by stuttering patterns of anginal pain that coincide with the growth and regression of thrombi. These thrombi form because of changes in the plaque. The plaque loses its endothelial covering, is infiltrated by macrophages, and thickens. Changes in the denuded plaque cause thrombi formation and regression, which alternately block an opening in the coronary artery lumen. Oftentimes the thrombus will fragment and embolize to lodge downstream and occlude smaller vessels causing distal myocardial infarction.

Current therapy

Basically, anginal pain is caused by myocardial ischemia. Consequently, therapies directed to relieve or diminish angina are focused on improving myocardial blood flow. These are: medications, PTCA, and CABG. Although many patients can be helped by these therapies, there are subpopulations of individuals that cannot be.

Medications for angina work by multiple mechanisms. They can dilate the smooth muscle and coronary arteries, decrease myocardial oxygen demand, or attempt to control plaque formation. The drugs being used to stabilize plaques are relatively new; they can prevent plaques from growing, cause a regression of the plaque, or limit thrombogenesis. Traditional drugs used as antianginals are nitrates, calcium channel blockers, and beta blockers. Nitrates dilate coronary vessels via release of nitrous oxide, and also cause peripheral vasodilatation at higher doses, thereby reducing the work of the heart. Nitrates are available in many different forms: IV, transdermal patches, and sublingual tablets. Calcium channel blockers prevent vascular smooth muscle contraction and reduce contractility and oxygen demand of the myocardium. The beta blockers inhibit sympathetic input to the heart and blood vessels, thereby causing a decrease in heart rate and contractility and a vasodilatation of coronary and peripheral blood vessels. Antianginal medications are advantageous because they are useful in palliating a large number of patients suffering from angina, but these drugs do not lessen the degree of atherosclerosis. Nitrates may be accompanied by side effects that limit efficacy in many patients.

PTCA is a catheter-based procedure that can often be performed on an outpatient basis. In the United States, there are almost 400,000 PTCA procedures performed annually.[4] In most transluminal angioplastic procedures a small catheter is threaded through a peripheral artery to the root of the aorta. From the aorta, the catheter is maneuvered to an area of atherosclerotic tissue. There are many different interventions that can be used via the transluminal approach. The most common intervention is PTCA, in which a balloon surrounds the tip of the catheter and is inflated at the atherosclerotic plaque. This causes the plaque to rupture and flatten into the wall; it provides immediate relief in most patients. Other techniques used by this catheter-based approach include the use of a vascular stent, laser ablation, mechanical atherectomy, or directional coronary atheroma. Sometimes more than one of these procedures is utilized in order to achieve lasting results. PTCA is a relatively safe procedure with few complications or side effects. It also has great utility in cases of emergency myocardial infarction. The major disadvantage with PTCA is that one-third of all patients will have restenosis,[3] requiring a repeat reintervention. Because of the threat of restenosis, patients who undergo PTCA must have close follow-up for recurrent symptoms. This adds to the total cost of the procedure. Initial cost for a PTCA and the average associated hospital stay is approximately $22,000.[5]

The coronary artery bypass operation (CABG) was developed in the late 1960s and is the most invasive procedure for alleviating anginal pain. The basic procedure entails grafting a vein or artery from another part of the body past the obstructive coronary lesion to supply blood to the ischemic heart tissue. Usually, the vessels used for bypass are the saphenous vein and the internal mammary artery. During CABG, numerous bypasses can be performed, thereby allowing reperfusion to many of the ischemic areas of the heart. As with PTCA, anginal relief is immediate with CABG, but as with all operations there are significant risks. Only 5% of patients who undergo CABG have recurrent anginal pain; usually because of occlusive disease of the grafts or the native coronary vessels, and require a repeat CABG or PTCA. The cost for a CABG procedure and hospital stay is approximately $28,000 to $42,000,[6] which may be greater than the cost for single PTCA.

Another form of CABG is minimally invasive direct coronary artery bypass (MIDCAB) surgery. MIDCAB is bypass graft surgery performed via small incisions made in the chest wall between ribs without the need for cardiopulmonary bypass. The procedure usually entails grafting the left anterior descending artery with the left internal mammary artery via a limited anterior thoracotomy. The internal mammary artery is dissected under direct vision or by thorascopic assistance. The anastomosis of the internal mammary artery and left anterior descending artery is performed while the heart is beating, with or without cardiopulmonary bypass. The benefits of doing MIDCAB procedures are avoiding cardiopulmonary bypass and median sternotomy, early extubation, improved recovery time, and reduced length of hospital stay. These should reduce hospital cost. The long-term outcome is controversial because of the limited data available.

Transmyocardial revascularization

Unfortunately, CABG and PTCA may not be applicable for patients who have diffuse disease with poor runoff or occlusions in small vessels, thereby severely limiting the therapies that these patients can receive. Transmyocardial laser revascularization (TMR) is a procedure that is being clinically evaluated to reduce anginal pain. Unlike these other therapies that attempt to fix the currently stenosed vessels, TMR may promote angiogenesis by creating temporary areas of injury in an effort to revascularize the ischemic myocardium.

The principle underlying TMR has been considered for a long time. In 1933, Wearns and colleagues discovered the presence of myocardial sinusoids.[7] These sinusoids were found to be an important source of myocardial perfusion in reptiles, but their role in human myocardium was poorly understood. The reptilian sinusoids utilized endocardial ventricular channels to perfuse the myocardial tissue. Researchers attempted to mimic this type of blood flow in human hearts that are characterized by epicardial blood flow. Many different methods were used: needle acupuncture, myocardial incisions, punch biopsy, and insertion of T-tubes. Many of these methods were successful in reducing anginal pain, but the channels that were formed would occlude and fibrose within a matter of months. In 1986, Mirhoseini et al. performed the first TMR with a laser, spawning the first FDA-sponsored clinical trials in 1991.

During TMR, approximately 10 to 40 channels, from about 1.0 mm in diameter, are created through the ischemic myocardial wall.[8] The channels formed remain patent for variable time periods. Through an unknown mechanism, the laser-created channels appear to stimulate or induce angiogenesis through the ischemic myocardium. The angiogenesis may be the actual mechanism by which improved blood flow through the myocardial tissue occurs. Unlike other procedures used to lessen anginal pain, TMR does not work immediately. Angina

TABLE 1. Possible complications following the TMR procedure.

Complications	Comment
• Bleeding	Postoperative bleeding is possible despite thorough observation of epicardial surface before completion of surgery
• Pain	Due to thoracotomy
• Dysrhythmia	Laser channels throughout the left ventricular myocardium increase the potential for conduction pathway involvement. Ventricular arrythmias may occur but incidence unknown.
• Valvular Insufficiency	Potential for chordae and/or leaflet involvement is possible due to anatomy of interior left ventricle. Mitral valve anatomy is evaluated before and after surgery.
• Congestive Heart Failure (CHF)	Laser channeling the left ventricle has shown to increase the potential for postoperative pulmonary congestion and CHF. Prevention and management are instituted via the use of IV diuretics and inotropes and occasionally balloon pump support.
• Low Cardiac Output	Postoperative decreased ejection fraction (<20%) requires the use of pharmacologic and mechanical support
• Angina	Preoperative cardioactive medication is resumed after TMR due to the length of time required for angiogenesis
• Anticoagulation	IV or subcutaneous heparin is initiated 12 hours after the procedure.
• Atelectasis	Due to lung ventilation during the procedure and postoperative incisional pain

is reduced over a period of months, as new blood vessels penetrate the ischemic myocardium.

The surgical procedure involves a small surgical incision in the thoracic wall, through which the laser apparatus can be put in touch with the ischemic myocardium. This is done by making a small incision between the ribs to expose the heart muscle. The laser apparatus is then put in direct contact with the beating heart. Laser pulses are delivered to create the channels, but the laser pulses are only activated when the ventricle is filled with blood. This prevents damage to the myocardium opposite the channels and avoids stimulating the heart during times most vulnerable to arrythmia. Clinical evidence shows that the outside of the channels heals, while the endocardial surface may or may not remain patent. Blood is forced into these new blood vessels, exposing the ischemic myocardium to oxygenated blood.

The procedure takes approximately one to two hours and requires a hospital stay of about four to five days. The cost for TMR is considerably lower than CABG at $12,000 to $18,000.[6] A procedure is under development to perform TMR through a thoracoscopic approach; this would make the procedure even less invasive.[9]

TMR has many advantages over other forms of angina management.[10] The entire procedure is performed while the heart is beating; therefore, there is no need for extracorpeal circulation, no cross-clamping of the aorta, and no cessation of the heart. Unlike CABG surgery, anticoagulants are not used during TMR. There is also a decreased risk of embolization, which is usually associated with aortic cross-clamping and cannulation. As with all surgical procedures, especially those concerning the heart, there are complications (**Table 1**).

TMR is regularly performed in Europe, Asia, and the Middle East. So far, approximately 3,000 procedures[11] have been performed in these parts of the world, and 500 procedures[10] in the United States. Clinical trials began in 1991 in the United States. Numerous corporations have manufactured a TMR system, so there are many different clinical trials being pursued at this time.

Current research on TMR

Most of the research articles published on the efficacy of TMR use patients for whom other therapies are unsuitable or have been ineffective. Patients are selected because they have severe or unstable angina not amenable to conventional therapies. In most of the studies concerning TMR the patients were tested before the revascularization procedure and then followed up for a particular length of time, ranging from three months to two years. Testing consisted of angina classing, exercise tolerance, single photon emission computed tomography (SPECT perfusion scans), PET, dobutamine echocardiography (to measure left ventricular ejection fraction [LVEF] and wall motion), and multigated acquisition radionuclide ventriculography (MUGA). Comparisons are then made from postoperative to preoperative patient cardiac status. Randomized control clinical trials are in progress, but the data from these studies are not yet available.

In the report by Frazier et al.[7] 31 patients were tested by preoperative PET, ^{201}T1-SPECT, MUGA, exercise tolerance,

and dobutamine echocardiography. Subjects were tested at 3 months and 6 months after TMR. The CCS angina class was also determined preoperatively and at the follow-up time points, as well as the RPP (rate pressure product–maximum heart rate multiplied by the systolic blood pressure while on the treadmill). Significant improvement was observed in the CCS angina class at 3 and 6 months, in the treadmill tolerance at 3 and 6 months, and in the change in RPP at 6 months (**Table 2**).

TABLE 2. Comparisons of patient cardiac function preoperatively and at 3 and 6 months postoperatively after TMR.

	Baseline (n=21)	3 months (n=15)	6 months (n=15)
Mean Angina Class	3.7±0.3	2.4±0.9*	1.7±0.8*
Treadmill Tolerance (min)	4.6±2.8	8.7±3.1*	9.9±3.9*
Change in RPP	50±34	83±47	117±66*

**Significant compared to baseline with p<0.5. (5)*

Measurements were also made calculating the ratio of subendocardial perfusion to subepicardial perfusion (SEn/SEp) as determined by PET perfusion analysis. Significant improvement was also found after 3 and 6 months both at rest and during stress (**Table 3**). The regional wall motion score index (WMSI) was also significantly improved in treated wall segments.

However, mean myocardial perfusion, determined by ^{201}Tl-SPECT and LVEF (changes in rest and stress), was not significantly improved by TMR at these postoperative milestones.

A study with a two-year follow-up conducted by Horvath et al[12] shows results similar to the Frazier study, although fewer tests of cardiac function were performed. This study examined angina class, frequency of hospital admissions and of sublingual nitroglycerin usage, and postoperative alterations in myocardial perfusion as determined by ^{201}Tl-SPECT. Tests were conducted at 3, 6, 12, and 24 months. Before TMR, baseline status of all patients was CCS angina class of III or IV. As in the previous study, CCS angina class improved significantly (3.7±0.5 to 1±0.9 at 13-26 months). Sublingual nitroglycerin usage also declined significantly from 8±4 to 1±0.8 tablets per week at 13-26 months. Perfusion difference was judged by calculating the number of segments in the heart that displayed fixed ischemia or reversible ischemia. There was a statistically significant decrease in the number of fixed and reversible ischemic segments as compared to baseline. The significance was greater in the decline of reversible segments than in fixed segments. The same authors also analyzed results from several institutions to achieve patient records for 200 TMR procedures.[13] This study corroborated results. Donovan et al[14] used dobutamine stress echocardiography and found a significant decrease in the number of ischemic segments after TMR.

To examine a potential complication of high energy TMR CO_2, von Knobelsdorff et al[15] conducted a trial to determine if the laser energy vaporized blood and thereby caused bubbles to form cerebral microemboli. The investigators measured mean blood flow velocity (V_{mean}) in the middle cerebral artery via Doppler sonography at jugular bulb oxygen saturation (SjO_2). Although microemboli were detected in the middle cerebral artery after creation of laser channels, the microemboli had no effect on V_{mean} or SjO_2. The results demonstrated that no global oxygen imbalance was induced by the microemboli.

Conclusion

None of the currently published studies evaluating efficacy of TMR to date are control type studies. This fact confounds comparison between TMR and other forms of angina management (i.e., CABG, PTCA, pharmacologic). It is important to consider that in each of these studies, only the most severely symptomatic patients were qualified to undergo TMR. Ongoing randomized clinical trials involve patients that would normally qualify for other therapeutic procedures. These trials will allow for a direct comparison be-

TABLE 3. Significant increases in ratio of SEn/SEp from baseline in lased segments of myocardium 3 and 6 months after TMR.[7]

	3 months (% increase over baseline)	6 months (% increase over baseline)
SEn/SEp at rest (lased segments)	14.27% (p<0.001)	21±11% (p<0.001)
SEn/SEp during stress (lased segments)	31% (p<0.0001)	37±21% (p<0.0001)

tween the different types of angina management and TMR. In most available reports, the sample sizes were small (12-20 patients) and the length of follow-up was short. The most important information concerning TMR still needs to be elucidated; that is, the mechanism by which the therapeutic benefit (reduction of angina) is achieved. This would add credence to the procedure by providing the physiological or biochemical basis for TMR.

From the current trials, it seems that TMR has had marked success in improving the lives of patients for whom no alternative therapy exists. The significant reduction in angina class documented in all of the studies underscores overall improvement in quality of life for these subjects. Therefore, for patients who cannot undergo CABG or PTCA, we believe that TMR is a reasonable option. Unfortunately, long-term follow-up in the patients represented in these studies is lacking, so the durability of TMR is unknown. Additional use for TMR, such as in conjunction with CABG,[16] remain to be evaluated by current randomized control trials such as those using the Holmium: YAG laser. Initial experience with percutaneous (transfemoral) Holmium: YAG TMR therapy is also most promising.[17]

References

1. Robins SD. Transmyocardial revascularization and the angina patient. *TMR Bulletin* 1997;1–4.
2. Benditt EP, Schwartz SM. Blood vessels. *Essential Pathology*. New York: JB Lippincott Company; 1995.
3. *Transmyocardial Revascularization in the Management of Angina*. Seattle: Communicore; 1997.
4. *Heart and Stroke Facts: 1996 Statistical Supplement*. Dallas,Texas: American Heart Association; 1996.
5. Alfieri O, Lorusso R. Developments in surgical techniques for coronary revascularization. *Curr Opin Cardiol* 1995;10:556–561.
6. Frazier OH. Laser surgery offers hope for patients with inoperable coronary disease. *Modern Medicine* 1996;64:27.
7. Frazier OH, Cooley DA, Kadipasaoglu KA. Myocardial revascularization with laser. Preliminary findings. *Circulation* 1995;92 (9 Suppl):II58–II65.
8. TMR using The Heart Laser. Found at *http://www.plcmed.com/tmrproc.htm:* 1998. PLC Medical Systems, Inc.
9. Milano A, Pietrabissa A, Bortolotti U. Transmyocardial laser revascularization using a thoracoscopic approach. *Am J Cardiol* 1997;80:538–539.
10. Carlson PC. Patient care and expectations for recovery after transmyocardial laser revascularization. *AACN Clin Issues* 1997;8:33–40.
11. FDA Panel Rejects Heart Laser Treatment for Angina. *http://www.heartinfo.com/News 97/tmr73197.htm* /1998
12. Horvath KA, Mannting F, Cummings N. Transmyocardial laser revascularization: operative techniques and clinical results at two years. *J Thorac Cardiovasc Surg* 1996;111:1047–1053.
13. Horvath KA, Cohn LH, Cooley DA. Transmyocardial laser revascularization: results of a multicenter trial with transmyocardial laser revascularization used as sole therapy for end-stage coronary artery disease. *J Thorac Cardiovasc Surg* 1997;113:645–653.
14. Donovan CL, Landolfo KP, Lowe JE. Improvement in inducible ischemia during dobutamine stress echocardiography after transmyocardial laser revascularization in patients with refractory angina pectoris. *J Am Coll Cardiol* 1997;30:607–612.
15. von Knobelsdorff G, Brauer P, Tonner PH. Transmyocardial laser revascularization induces cerebral microembolization. *Anesthesiology*. 1997;87:58–62.
16. Trehan N, Kohli VM, Mishra A, et al. Transmyocardial laser revascularisation as an adjunct to CABG. *Indian Heart J* 1996;48:381–388.
17. Oesterle SN, Schuler G, Lauer B, et al. Percutaneous myocardial laser revasularization: initial human experience. *Circulation.1997;96 (8 Supp I): I-28.* ■

Antoine Marfan and his syndrome: one hundred years later

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ABSTRACT: *In 1896, in the* Bulletin of the Medical Society of Paris, *Antoine Marfan described a five-year-old girl with arachnodactyly. It took almost 50 years to fully elucidate this syndrome including aneurysm of the ascending aorta. It is critical to make an early diagnosis of Marfan aneurysm because there is a high frequency of dissection and rupture once the aortic diameter reaches 6 cm. Before the availability of the Bentall composite graft procedure in 1968, the operative results were very poor. The Bentall operation now carries a 30-day mortality rate of less than 5% at major cardiac surgical centers.*

Two hundred and thirty-one Marfan patients underwent aortic root replacement at The Johns Hopkins Hospital between September 1976 and December 1997. The 30-day mortality for 198 patients undergoing elective aortic root replacement was 0%. Two of 33 patients undergoing urgent surgery died in the first 30 days after surgery; both of these patients arrived in the operating room with ruptured aortas. The actuarial survival for the 231 patients undergoing aortic root replacement was 88% at five years, 81% at ten years, and 75% at 20 years.

Clearly, the outlook for Marfan patients undergoing elective aortic root replacement has been excellent. Accompanying the steadily improving surgical results have been spectacular developments in understanding the genetic role in Marfan families. Since 1991, over 150 mutations have been discovered in the gene that is critical in the production of the structural protein fibrillin. The identification of mutations in the fibrillin

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Figure 1. Dr. Antonine Marfan (1858-1942) in an undated photograph probably taken in the 1930s.

gene has enabled the diagnosis of Marfan disease in some patients before they become symptomatic; prenatal diagnosis has been achieved in some patients. The ultimate hope for Marfan families is to eliminate the disease by genetic manipulation; however, this may be years away.

In 1896, Dr. Antoine Marfan presented a five-year-old girl to the monthly meeting of the Medical Society of Paris. This little girl, Gabrielle, was unique in that she had disproportionately long limbs that Marfan termed arachnid-like or spider legs. The case history was published in the *Bulletin of the Medical Society of Paris* in 1896 with a picture of Gabrielle.[1]

Marfan had been born in Toulouse in 1858 and commenced his medical education at the University of Paris in 1888. He had completed his internship in pediatrics three years before presenting Gabrielle to the Medical Society of Paris. He went on to have an illustrious career, becoming the first professor of pediatrics in France and co-developer of the BCG vaccine (**Figure 1**).

It took almost 50 years to fully elucidate the Marfan syndrome as we know it today. After Marfan described the arachnodactyly in his paper in 1896, dislocated lenses were described in 1914, and the dominate heritable trait in 1931. In 1943, Helen Taussig published a paper[2] about two teenage

Figure 2. This aortogram depicts a classical pear-shaped Marfan aneurysm of the aortic root that is 7 cm in maximum diameter.

girls at Johns Hopkins Hospital with these three Marfan traits; both girls had died of a ruptured aneurysm of the ascending aorta. It is interesting that the most life-threatening component of this syndrome, aortic aneurysm, was not discovered until almost 50 years after Marfan's original paper. In 1955, Victor McKusick at The Johns Hopkins Medical Institutions refined the description of the Marfan syndrome with a landmark publication.[3] About the same time as that publication, McKusick established a Marfan Clinic at The Johns Hopkins Hospital.

Considerable suspicion exists among medical geneticists that Abraham Lincoln may have had the Marfan syndrome. He certainly was tall and had long extremities, but he lived well past the average Marfan life expectancy of 32 years. Victor McKusick currently heads a National Science Foundation panel assigned to determine whether Lincoln had the Marfan syndrome. Fragments of Lincoln's skull as well as the blood- stained sleeve of the autopsy surgeon, Edward Curtis, have been preserved at the Walter Reed Museum for Health and Medicine. The skull fragments and blood stains will be analyzed by McKusick's team when DNA and genetic laboratory techniques are refined enough to provide a reliable answer about Lincoln and the Marfan syndrome.

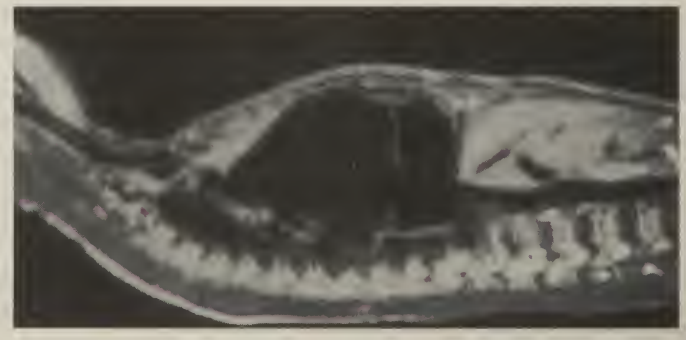

Figure 3. An MRI depicts a 9-cm diameter Marfan aneurysm of the aortic root in a nine-year-old boy.

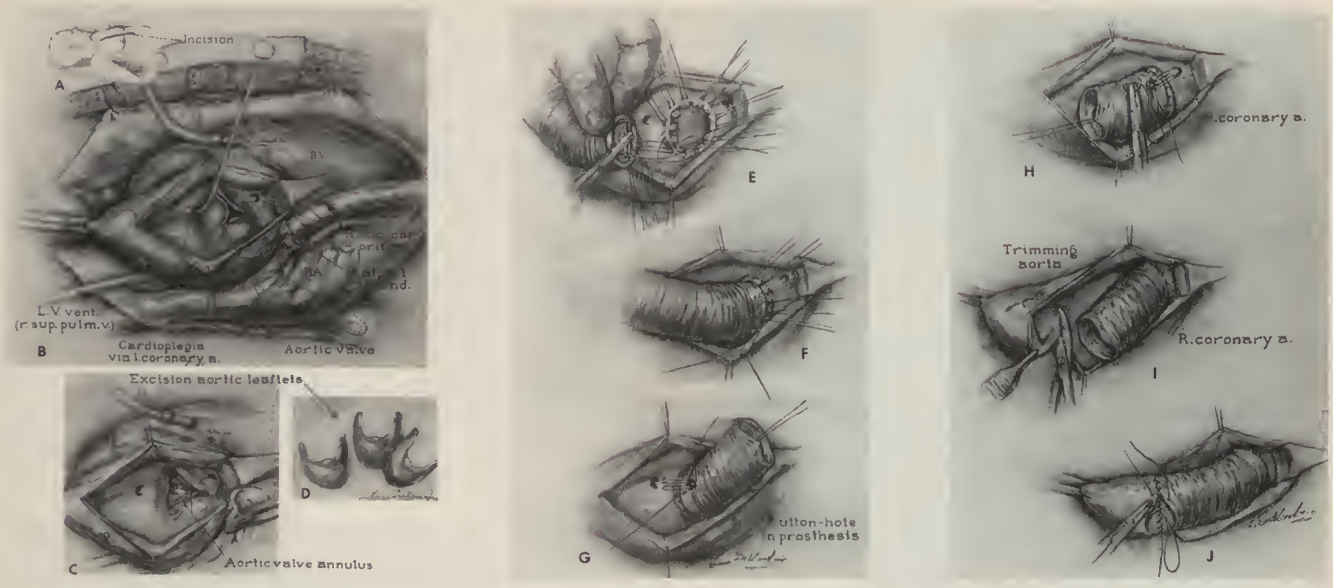

Figure 4. *A-H.* Standard composite graft repair as adapted from Bentall and DeBono. *E.* Mattress sutures are placed below annulus if coronary ostia are low. *I.* Aorta is completely transected to facilitate distal end-to-end anastomosis. A no-wrap technique is used; redundant aneurysm wall is tacked loosely over composite graft. LV = left ventricular, RA = right atrium, RV = right ventricle.
(From Gott VL, Pyeritz RE, Cameron DE, et al. Composite graft repair of Marfan aneurysm of the ascending aorta: results in 100 patients. *Ann Thorac Surg* 1991;52:38–45. Reprinted with permission of The Society of Thoracic Surgeons.)

The diagnosis of Marfan aneurysm has always been easy to make if aneurysm is in the differential. The aortogram (**Figure 2**) is classic and a thoracic MRI (**Figure 3**) can provide an excellent demonstration of the aneurysm.

In the fourth edition of McKusick's textbook, *Heritable Disorders of Connective Tissue*, published in 1972,[4] there is a 160-page chapter on Marfan disease, but only one page is devoted to surgical management. This was because the early surgical results with resection of Marfan aneurysms of the ascending aorta were extremely poor. In the 1960s, these patients were seldom operated on electively. Surgeons usually waited until the aneurysms dissected or ruptured because the operative results were so poor, even for elective surgery.

The very discouraging outlook for Marfan patients changed overnight when, in 1968, Hugh Bentall of London conceived a new operation for aortic root replacement while at the operating table.[5] He was operating on a young woman with a 9-cm Marfan aneurysm of the ascending aorta. There was no way to place a sleeve graft above the coronary arteries, so he sewed a prosthetic ball valve into the lower end of the graft and lowered this composite graft into position. He then constructed direct anastomoses to the coronary ostia.

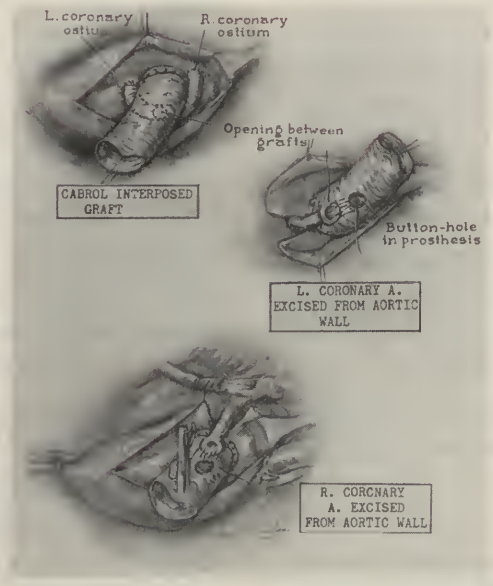

Figure 5. Technique of Cabrol interposed graft. This method of dealing with low-lying coronary ostia has been replaced by mobilization of coronary ostia as depicted.
(From Gott VL, Pyeritz RE, Cameron DE, et al. Composite graft repair of Marfan aneurysm of the ascending aorta: results in 100 patients. *Ann Thorac Surg* 1991;52:38-45. Reprinted with permission of The Society of Thoracic Surgeons.)

With this operation the surgical results for Marfan patients dramatically improved. Bentall's operative technique of placing a composite aortic graft is depicted in **Figure 4**. More recently, most cardiac surgeons have adopted the use of a coronary button technique (**Figure 5**). Using this technique, both coronary arteries are surgically isolated with a small surrounding button of aortic wall. These two coronary buttons are then implanted into the wall of the tubular dacron graft used to replace the ascending aorta. This technique allows the surgeon to operate fairly easily on aneurysms that are 5.0 to 5.5 cm in diameter.

We performed our first Bentall composite graft procedure at The Johns Hopkins Hospital in September 1976, and over the last 21 years (through December 1997) we have replaced the aortic root in 231 Marfan patients.

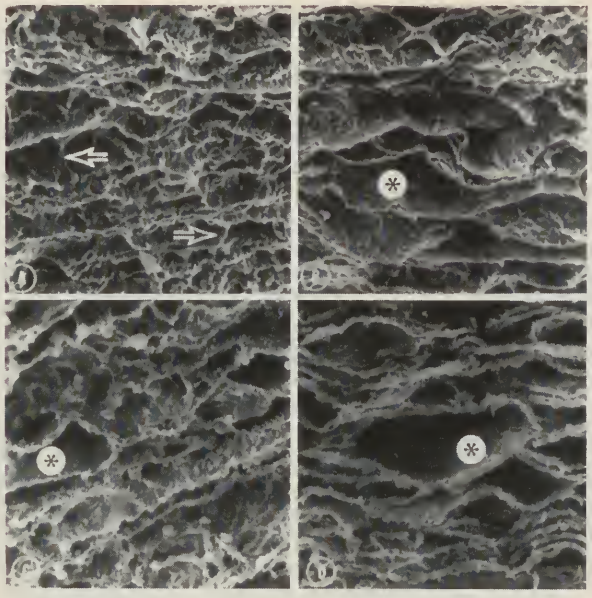

Figure 6. Aortic elastin as viewed by scanning electron microscopy (original magnification x 500). **A** shows normal aortic wall. **B,C, and D** depict progressively more severe disruption of elastin microfibrils in the aortic wall of patients with Marfan disease. See text for further details.
(Perejda AS, et al. Marfan's syndrome: structural, biochemical, and mechanical studies of the aortic media. *J Lab Clin Med* 1985;106:376-383. Reprinted with permission.)

(Eleven different surgeons performed the operations.) Two hundred and eighteen of the patients had a composite graft repair, 11 had an aortic root replacement with a homograft, and two had the newer valve-sparing procedure. The valve-sparing procedure was popularized by Yacoub in England in the early 1980s.[6] With this technique, the aneurysm is resected, but the aortic valve is left intact and the coronary arteries are reimplanted with small buttons of aortic wall into the dacron graft.

In our group of 231 Marfan patients undergoing aortic root replacement, there were 168 males and 63 females; the average age at the time of surgery was 32.8 years with an age range from 4 to 73 years. The average aortic root diameter at the sinus level in 223 adult patients was 6.8 cm. The average aortic root diameter for 43 patients with aortic dissection was 7.5 cm; 14 of these patients had aortic dissection with an aortic diameter of 6.5 cm or less, emphasizing that Marfan aneurysms should be resected by the time they reach 5.5 to 6.0 cm even if the patient is asymptomatic.

One hundred and ninety-eight of our Marfan patients undergoing aortic root replacement had elective surgery; there was no 30-day mortality in this group. Thirty-three patients had urgent repair mainly for acute dissection with two deaths; both of the patients who died arrived in the operating room with frank rupture of the ascending aorta and were moribund before surgery was initiated. The overall 30-day mortality was 0.9%. Our morbidity has been in three primary areas: endocarditis, thromboembolism, and late coronary anastomotic dehiscence. The most serious late complication was endocarditis, which occurred in eight patients; three died of this complication, two were successfully treated with antibiotics, and three were successfully repaired with a homograft aortic root. Seven patients sustained late thromboembolism; six of these patients made a complete recovery. Four patients developed a late dehiscence of a coronary artery anastomosis; three survived redo operation, and one patient unfortunately died seven years postoperatively without benefit of surgery. The actuarial survival for the 231 Marfan patients was 88% at five years, 81% at ten years, and 75% at 20 years.

Clearly, the outlook for Marfan patients undergoing surgical repair of the ascending aorta has been very gratifying. Accompanying these steadily improving surgical results have been spectacular developments in understanding the genetic role in these Marfan families. It has been known for years that Marfan disease is transmitted by autosomal dominant inheritance. It has also been known for some time that the connective tissue of Marfan patients contains defective fibrillin. Fibrillin is a major structural protein in connective tissue and therefore critical in the strength of the aortic wall. Defective fibrillin can account for the striking changes in the scanning electron micrographs published 13 years ago by Perejda[7] (**Figure 6**). The staining in these micrographs is for the other major protein in connective tissue, elastin. These studies show that in a cross-section of normal aortic elastin, there are longitudinal parallel laminae with numerous perpendicular intralamellar fibers. However, in the Marfan aorta there is marked reduction in intralamellar connecting fibers with, in some patients, a Swiss cheese appearance of the elastin fibers.

A reasonable model for understanding the relationship of fibrillin and elastin would be a concrete column reinforced by steel rods; the main strength comes from the reinforcing rods and added strength comes from the surrounding concrete. This type of reinforced concrete column is somewhat analogous to the fibrillin microfibrils supporting the more amorphous protein elastin; fragmentation of the fibrillin microfibrils therefore can lead to the Swiss cheese appearance of elastin in Figure 6.

In 1990, a Finnish research team lead by Katariina Kainulainen[8] demonstrated that the fibrillin gene is located on the long arm of chromosome 15. In 1991, Harry Dietz and his associates at Johns Hopkins reported their discovery of the first mutation in the fibrillin gene.[9] This first mutation resulted in the substitution of the amino acid proline for arginine in the

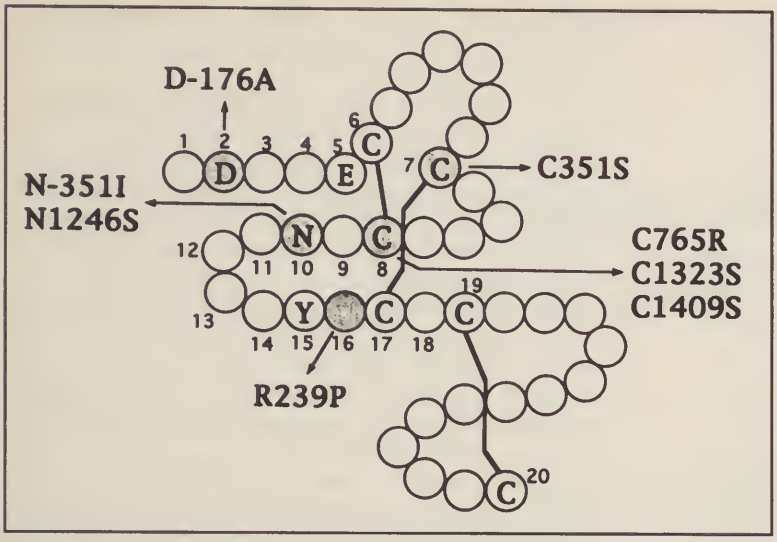

Figure 7. Distinctively pleated amino acid domain that makes up two-thirds of the structure of the fibrillin monomer. Amino acids that contribute to the calcium-binding properties of fibrillin are numbered sequentially. Amino acids that have been substituted by naturally occurring mutations in Marfan disease are shaded. The sites of specific mutations are indicated by arrows. Bold lines indicate disulfide linkages between cysteine (C) residues. (Dietz HC, et al. Four novel FBNI mutations: significance for mutant transcript level and EGF-like domain calcium binding in the pathogenesis of Marfan syndrome. *Genomics* 1993;17:468-475. Reprinted with permission.)

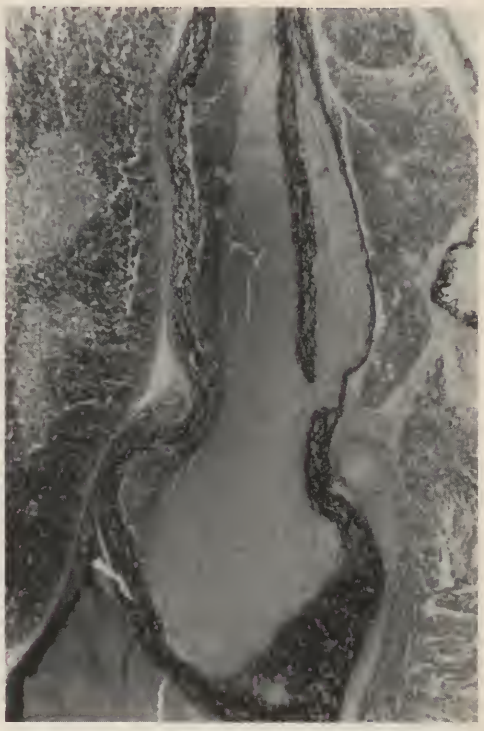

Figure 8. Ascending aorta of mouse with aneurysmal changes, dissection and rupture. (Pereira L, et al. Targeting of the gene encoding fibrillin-1 recapitulates the vascular aspect of Marfan syndrome. *Nat Genet* 1997;17:218-222. Reprinted with permission.)

fibrillin monomer. A subsequent publication by Dietz and associates[10] shows a precisely pleated 42-amino acid polypeptide that makes up most of the fibrillin monomer (**Figure 7**). It is known that fibrillin has a high affinity for calcium and that calcium binding by this pleated polypeptide depends on the six cysteine (C) amino acids with disulfide linkages as indicated by the bold lines. As noted in Figure 7, four of the mutations occurred at a cysteine location, resulting in substitution of other amino acids for the critical cysteine.

Over the last seven years, more than 150 new mutations have been found in the fibrillin gene. Certainly, if normal fibrillin function depends on calcium-binding properties of the pleated domains and this property is severely altered by mutant changes, the strength of connective tissue in the aortic wall will be markedly reduced.

Over the last three years, Dietz and his associates have attempted to develop a mouse model of the Marfan syndrome. These investigators have injected abnormal fibrillin genes from Marfan patients into a single fertilized mouse ova and have created a mouse with a Marfan aneurysm.[11] In Figure 8, one may note that the mouse ascending aorta looks very much like a human Marfan aneurysm. This aorta has, in fact, dissected and ruptured. The ultimate hope for Marfan families is to eliminate the disease completely by genetic manipulations; however, this seems virtually impossible, at least within the next 10 to 15 years.

At the turn of the century Sir William Osler stated, "There's no disease more conducive to clinical humility than aneurysm of the aorta." That was certainly true in 1896 when Antoine Marfan described his five-year-old patient at that Paris medical conference. Fortunately, we now have an operation for Marfan patients that provides excellent long-term results. Unfortunately, hundreds of Marfan patients with life-threatening aneurysm still go undiagnosed every year, even when they present in the emergency room with classical signs and symptoms of acute dissection. A recent high-profile example of misdiagnosis of a dissecting aneurysm occurred in Jonathan Larsen, the playwright who conceived and produced the musical *Rent*. Five days before the show opened on January 27, 1996, he developed severe chest pain and was seen in a New York City emergency room. Chest x-rays were obtained and he was sent home with a diagnosis of food poisoning. Two days later the symptoms reappeared. He returned to another emergency room, again with excruciating chest pain; a chest x-ray was obtained and again he was sent home with the diagnosis of viral gastritis. Tragically, he died 24 hours later, shortly after the final dress rehearsal of his new musical. He had ruptured a large Marfanoid aneurysm of the ascending aorta. It is unfortunate that patients similar to Jonathan Larsen

can present in an emergency room with signs and symptoms of aortic dissection and with a suspicious chest x-ray, yet not have the correct diagnosis made.

There is now an exceptional operation for a problem that was so difficult to manage 25 years ago. Marfan patients can undergo elective surgery with an operative risk well below 5%, and have an excellent likelihood of a normal life expectancy. It is essential, however, that a timely diagnosis of aortic aneurysm be made in these patients.

References

1. Marfan AB. Un cas de deformation congenitale des quatre membres, plus prononcee aux extremities, caracterisee par l"allongement des os avec un certain degre d'amincissement. *Bul Soc Chir Paris* 1896;13:220–225.
2. Baer RW, Taussig H, Oppenheimer EH. Congenital aneurysmal dilations of the aorta associated with arachnodactyly. *Bull Johns Hopkins Hosp* 1943;72:309–331.
3. McKusick VA. The cardiovascular aspects of Marfan's syndrome: a heritable disorder of connective tissue. *Circulation* 1955;11:321–342.
4. McKusick VA. The Marfan syndrome. In: McKusick VA, ed. *Heritable Disorders of Connective Tissue*. CV Mosby: St. Louis, MO. 1972;61–223.
5. Bentall H, DeBono A. A technique for complete replacement of the ascending aorta. *Thorax* 1968;23:338–339.
6. Sarsam MA, Yacoub M. Remodeling of the aortic valve anulus. *J Thorac Cardiovasc Surg* 1993;105:435–438.
7. Perejda AJ, Abraham PA, Carnes WH, et al. Marfan's syndrome: structural, biochemical, and mechanical studies of the aortic media. *J Lab Clin Med* 1985;106:376–383.
8. Kainulainen K, Pulkkiren L, Savolainen A, et al. Location on chromosome 15 of the gene defect causing Marfan syndrome. *N Engl J Med* 1990;323:935–939.
9. Dietz HC, Cutting GR, Pyeritz RE, et al. Marfan syndrome caused by a recurrent de novo missense mutation in the fibrillin gene. *Nature* 1991;352:337–339.
10. Dietz HC, McIntosh I, Sakai LY, et al. Four novel FBN1 mutations: significance for mutant transcript level and EGF-like domain calcium binding in the pathogenesis of Marfan syndrome. *Genomics* 1993;17:468–475.
11. Pereira L, Andrikopoulous K, Tian J, et al. Targeting of the gene encoding fibrillin-1 recapitulates the vascular aspect of Marfan syndrome. *Nat Genet* 1997;17:218–222. ■

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New initiatives in minimally invasive cardiac surgery

James D. Fonger, M.D.

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Conventional cardiac surgery underwent continual iterative improvements throughout the 1970s and 1980s that have resulted in excellent clinical outcomes. In the 1990s new developments in thoracic surgery have had a profound effect on the direction of cardiac surgery.[1,2] The recognition that surgery within the chest could be done with the same endoscopic techniques recently established in general surgery coincided with the use of arterial conduits for grafting multiple coronary arteries.[3-7] Developing countries had been accumulating substantial experience with epicardial coronary grafting on a beating heart without the support of cardiopulmonary bypass.[8,9] When a small directed chest incision instead of a sternotomy was combined with these new directions, the field of minimally invasive cardiac surgery was born.[10-14] Availability of advanced technologies, coupled with the desire for more cost-effective care, has fueled these developments into a burgeoning subspecialty that focuses on minimally invasive approaches.[15-19]

These are new paradigms in the treatment of coronary, valvular, and congenital heart disease. In addition to strategies that are less invasive and involve less risk, there are also new considerations being given to how much therapy is appropriate to achieve the treatment goals and whether this should be staged into smaller interventions. As catheter-based interventions improve, the role for combining this with surgery is also gaining more importance in various hybrid formats.[20,21] As technology improves, the availability and training for its use will begin to mandate a center of excellence approach, assuring the proximity of the people, equipment, protocols, and data collection involved with complex occasional-use devices. This review will touch upon some of the developments driving these changes and suggest how this might reconfigure the practice of cardiac surgery in the next millennium.

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In general, when cardiac surgical incisions become smaller, the surgeon faces new challenges in establishing cardiopulmonary bypass, visualizing what is being done, and actually doing the required procedure through a more restricted portal of entry. The new incisions being used include partial sternotomies, smaller thoracotomies, and even epigastric incisions that approach the heart from below. Small incisions often make central or direct cannulation for cardiopulmonary bypass problematic and have given rise to femoral cannulation strategies and hardware, which have become widely available over the past two years.[22-26] This includes catheters, which also provide for the administration of cardioplegia without directly visualizing or externally clamping the aorta. Once the requirements for access are removed, the size of the surgical incision can be markedly reduced. At that point, visualization of the operative field and surgical manipulation become the limiting factors. Surgical visualization can now be augmented not only by standard endoscopes, but also by three-dimensional endoscopic visualization systems with head mounted displays that obviate the need to turn and watch a monitor during the procedure. Management of these new scopes can also be automated with voice-controlled robotic arms that relieve the assistant from long periods of static contraction and continued attention during complex and long procedures. Advancements in robotics have also been extended to the surgery itself so the surgeon can remotely control the actual hand instruments within the wound and do surgery from a location away from the actual operative field. Further progress in alternate cannulation techniques, better visualization aids, and robotic assistance will continue to advance the capabilities of cardiac surgeons as they do procedures through smaller more directed thoracic incisions.

Coronary bypass grafting

Surgical myocardial revascularization will be accomplished in a very different fashion in the next millennium. Conventional coronary bypass grafting has already been favorably impacted by the ability to harvest saphenous vein for the grafting from the leg through a single small incision at the knee using an endoscope.[26-30] This facilitates healing, mobilization, improves cosmesis, and reduces length of stay. Possibly even more significant is the increasing awareness of the long-term value of using arterial conduits for the bypass grafting, which ultimately reduces the need for repeat coronary interventions of any kind. For patients with limited coronary disease, minimally invasive approaches to accomplish surgical bypass grafting with arterial conduits are becoming well established. By mechanically stabilizing the area of interest on the epicardium and temporarily restricting the coronary flow to the grafting site, coronary bypass grafting can now be safely accomplished on the beating heart without exposing the patient to the risks of being supported by the cardiopulmonary bypass circuit. This approach is generically referred to as minimally invasive coronary artery bypass (MIDCAB) and can now be done to graft any of the coronary distributions around the heart with an arterial conduit. The advantages of this approach become even more significant in patients facing reoperative coronary grafting where functioning coronary grafts are often embedded within scar tissue and can now be left undisturbed with a MIDCAB approach. Patients who present with ischemia in the distribution of coronary arteries that are either too small or too diseased for bypass grafting also have new less invasive alternatives for symptomatic relief. These include the placement of transmyocardial laser channels or the injection of angiogenic substances, both of which stimulate the development of new collateral blood vessels to the ischemic region in the months after treatment.[31-39] The cumulative effect of all of these initiatives is beginning to dramatically change and presumably improve the overall approach to surgical coronary revascularization.

Valvular repair or replacement

The surgical repair of valvular heart disease has also benefited from recent developments in minimally invasive cardiac surgery. The requirement for cardiopulmonary bypass support and the actual surgical repair or replacement techniques are essentially the same as those that have been employed with conventional cardiac surgery. However, the access incisions have been modified and reduced to make them less invasive for the patient. These include partial upper sternotomies for aortic valve surgery and for some approaches to the mitral valve.[40-44] In addition, when alternate cannulation strategies are employed, mitral valve surgery can also be accomplished through a small right thoracotomy incision, obviating the need for a sternotomy incision altogether.[45-49] By combining this with the visualization and robotic technologies described above, the size of the thoracotomy incision for mitral valve surgery need now be only a fraction of what was required to do this only one or two years ago. These alternate incisions afford the patient less discomfort and an earlier return to full activity. The right thoracotomies can be completely hidden within the inframammary fold, particularly in females, and initial data suggests that patients are able to go home approximately one day earlier than with a conventional full sternotomy.

Congenital cardiac surgery

Congenital heart disease has also benefited from less

invasive surgical repair techniques. However, the conditions treated are more varied and do not lend themselves easily to summaries of cumulative experience. Nevertheless, endoscopic cardiac surgery in the congenital heart disease patient population has allowed for improved diagnosis through better intracardiac assessment by looking around corners into small hearts through small incisions. In addition, many therapies are also facilitated with these approaches. Some examples include the extracardiac ligation of patent ductus arteriosus with endoscopic techniques as well as the subxyphoid approach to atrial septal defect closure of an intracardiac lesion.[50,51] Progress in the congenital field is always slower given the smaller number of potential cases and the lag phase within industry for developing pediatric versions of the critical enabling technologies.

Hybrid revascularization

One area of increased interest is in the combining of minimally invasive coronary bypass grafting with catheter-based interventions in a hybrid or integrated format. The surgical grafting is usually done first. The catheter-based intervention follows either later the same day or the following day provided that renal function is reasonably well preserved. The general strategy is to surgically graft an arterial conduit to the primary target site, which may govern both long-term survival and symptomatic relief. Secondary symptom-only targets are then treated with a catheter-based intervention and appropriate anticoagulation for postintervention care is instituted. This also allows for the postoperative checking of the surgical graft in the cath lab with the opportunity to address any suboptimal findings with the conduit, anastomosis, or native coronary artery. Multiple targets may be addressed without a conventional full sternal incision or exposure to the cardiopulmonary bypass circuit. The hope is that this approach will be offered when it is felt that it represents the best of both therapies on appropriate targets. Patients understand they trade the risk of restenosis at the site of the catheter-based interventions for a less invasive multivessel treatment strategy. At Washington Adventist Hospital in Takoma Park, Maryland, as well as other sites around the world, purpose-made rooms have now been constructed to function as operative cath labs and allow for both the MIDCAB grafting and catheter-based interventions to be done during the same session without moving the patient. Experience with these facilities will help define the value of what might be the most efficient model for offering hybrid therapy on a regular basis.

Centers of excellence

Together, these new developments beget the question of whether every cardiac surgical institution should be focused on offering the full spectrum of sophisticated minimally invasive cardiac surgery and advanced enabling minimally invasive technologies. In addition to interested and capable surgeons doing the work, there needs to be the resources to manage protocols from the Federal Drug Administration, the National Institutes of Health, and the hospital internal review boards. Information exchange and partnering with industry is critical, and patients need to receive specific and different information about their procedures that is not part of conventional cardiac surgery patient handouts. Finally, the data about the procedures and their outcomes and follow-up must be collected within data vehicles that differ from a conventional cardiac surgical database. This has given rise to centers of excellence for minimally invasive cardiac surgery being formed at institutions like ours, which have a particular interest in these approaches. It is hoped that this will allow for synergy among the various disciplines involved with this type of surgical therapy to facilitate the coordination of the necessary resources which optimize patient care. It might be expected that over time centers such as this would develop in most major urban locations, forming a loose network of facilities across the country who share a common interest in these new disciplines. The full impact of this paradigm shift in thinking about cardiac surgical procedures has still not been felt, but already there has been a significant improvement in patient care. Work continues on the procedures, technology, patient selection, and clinical data to try and understand the best applications for these minimally invasive approaches. The dramatic progress in only a few years suggests that the future holds many more incremental improvements and the prospect of more comfort and less risk for patients undergoing cardiac surgical therapy in the next millennium.

References

1. Benetti FJ, Ballester C. Use of thoracoscopy and a minimal thoracotomy, in mammary-coronary bypass to left anterior descending artery, without extracorporeal circulation. Experience in 2 cases. *J Cardiovasc Surg* 1995;36:159–161.
2. Nataf P, Lima L, Regan M, et al. Minimally invasive coronary surgery with thoracoscopic internal mammary artery dissection: surgical technique. *J Card Surg* 1996;11:288–292.
3. Loop FD, Lytle BW, Cosgrove DM, et al. Influence of the internal-mammary-artery graft on 10-year survival and other cardiac events. *N Engl J Med* 1986;314:1–6.
4. Gardner TJ, Greene PS, Rykiel MF, et al. Routine use of the left internal mammary artery graft in the elderly. *Ann Thorac Surg* 1990;49:188–193.

5. Morris JJ, Smith LR, Glower DD, et al. Clinical evaluation of single versus multiple mammary artery bypass. *Circulation* 1990;82(5 Suppl):IV214–IV223.
6. Grandjean JG, Boonstra PW, den Heyer P, Ebels T. Arterial revascularization with the right gastroepiploic artery and internal mammary arteries in 300 patients. *J Thorac Cardiovasc Surg* 1994;107:1309–1315.
7. Suma H, Wanibuchi Y, Terada Y, et al. The right gastroepiploic artery graft. Clinical and angiographic midterm results in 200 patients. *J Thorac Cardiovasc Surg* 1993;105:615–622.
8. Benetti FJ, Naselli G, Wood M, Geffner L. Direct myocardial revascularization without extracorporeal circulation. Experience in 700 patients. *Chest* 1991;100:312–316.
9. Buffolo E, de Andrade CS, Branco JN, et al. Coronary artery bypass grafting without cardiopulmonary bypass. *Ann Thorac Surg* 1996;61:63–66.
10. Calafiore AM, Giammarco GD, Teodori G, et al. Left anterior descending coronary artery grafting via left anterior small thoracotomy without cardiopulmonary bypass. *Ann Thorac Surg* 1996;61:1658–1663.
11. Robinson MC, Gross DR, Zeman W, Stedje-Larsen E. Minimally invasive coronary artery bypass grafting: a new method using an anterior mediastinotomy. *J Card Surg* 1995;10:529–536.
12. Arom KV, Emery RW, Nicoloff DM. Mini-sternotomy for coronary artery bypass grafting. *Ann Thorac Surg* 1996;61:1271–1272.
13. Boonstra PW, Grandjean JW, Mariani MA. Improved method for direct coronary grafting without CPB via anterolateral small thoracotomy. *Ann Thorac Surg* 1997;63:567–569.
14. Boonstra PW, Grandjean JW, Mariani MA. Reoperative coronary bypass grafting without cardiopulmonary bypass through a small thoracotomy. *Ann Thorac Surg* 1997;63:405–407.
15. Benetti FJ. Coronary artery bypass surgery without extracorporeal circulation versus percutaneous transluminal coronary angioplasty: comparison of costs. *J Thorac Cardiovasc Surg* 1991;102:802–803.
16. Hlatky MA. Analysis of costs associated with CABG and PTCA. *Ann Thorac Surg* 1996;61(2 Suppl):S30–S32.
17. Mark DB. Implications of cost in treatment selection for patients with coronary heart disease. *Ann Thorac Surg* 1996;61:S12–S15.
18. Cohen DJ, Breall JA, Ho KK, et al. Economics of elective coronary revascularization. Comparison of costs and charges for conventional angioplasty, directional atherectomy, stenting, and bypass surgery. *J Am Coll Cardiol* 1993;22:1052–1059.
19. Doty JR, Fonger JD, Nicholson CF, et al. Cost analysis of current therapies for limited coronary artery revascularization. *Circulation* 1997;Nov 4:96(9 Suppl):II–III620.
20. Weintraub WS, King SB, Jones EL, et al. Coronary surgery and coronary angioplasty in patients with two-vessel coronary artery disease. *Am J Cardiol* 1993;71:511–517.
21. Emery RW, Emery AM, Flavin TF, et al. Revascularization using angioplasty and minimally invasive techniques documented by thermal imaging. *Ann Thorac Surg* 1996;62:591–593.
22. Schwartz DS, Ribakove GH, Grossi EA, et al. Minimally invasive cardiopulmonary bypass with cardioplegic arrest: a closed chest technique with equivalent myocardial protection. *J Thorac Cardiovasc Surg* 1996;111:556–566.
23. Stevens JH, Burdon TA, Siegel LC, et al. Port-access coronary artery bypass with cardioplegic arrest: acute and chronic canine studies. *Ann Thorac Surg* 1996;62:435–440.
24. Stevens JH, Burdon TA, Peters WS, et al. Port-access coronary artery bypass grafting: a proposed surgical method. *J Thorac Cardiovasc Surg* 1996;111:567–573.
25. Mohr FW, Falk V, Diegeler A, et al. Minimally invasive port-access mitral valve surgery. *J Thorac Cardiovasc Surg* 1998;115:567–574.
26. Cable DG, Dearani JA, Pfeifer EA, et al. Minimally invasive saphenous vein harvesting: endothelial integrity and early clinical results. *Ann Thorac Surg* 1998;66:139–143.
27. Allen KB, Griffith GL, Heimansohn DA, et al. Endoscopic versus traditional saphenous vein harvesting: a prospective, randomized trial. *Ann Thorac Surg* 1998;66:26–31.
28. Folliguet TA, Le Bret E, Moneta A, et al. Endoscopic saphenous vein harvesting versus 'open' technique. A prospective study. *Eur J Cardiothorac Surg* 1998;13:662–666.
29. Horvath KD, Gray D, Benton L, et al. Operative outcomes of minimally invasive saphenous vein harvest. *Am J Surg* 1998;175:391–395.
30. Cable DG, Dearani JA. Endoscopic saphenous vein harvesting: minimally invasive video-assisted saphenectomy. *Ann Thorac Surg* 1997;64:1183–1185.
31. Krabatsch T, Tambeur L, Lieback E, et al. Transmyocardial laser revascularization in the treatment of end-stage coronary artery disease. *Ann Thorac Cardiovasc Surg* 1998;4:64–71.
32. Diegeler A, Schneider J, Lauer B, et al. Transmyocardial laser revascularization using the Holium-YAG laser for treatment of end stage coronary artery disease. *Eur J Cardiothorac Surg* 1998;13:392–397.
33. Rosengart TK. Transmyocardial laser revascularization—a technique in evolution. *J Clin Laser Med Surg* 1997;15:299–300.
34. Mirhoseini M, Cayton MM. Transmyocardial laser revascularization: historical background and future directions. *J Clin Laser Med Surg* 1997;15:245–253.
35. Frazier OH, Kadipasaoglu KA, Cooley DA. Transmyocardial laser revascularization. Does it have a role in the treatment of ischemic heart disease? *Tex Heart Inst J* 1998;25:24–29.
36. Milano A, Pratali S, Tartarini G, et al. Early results of transmyocardial revascularization with a holmium laser. *Ann Thorac Surg* 1998;65:700–704.
37. Pelletier MP, Giaid A, Sivaraman S, et al. Angiogenesis and growth factor expression in a model of transmyocardial revascularization. *Ann Thorac Surg* 1998;66:12–18.
38. Mack CA, Patel SR, Rosengart TK. Myocardial angiogenesis as a possible mechanism for TMLR efficacy. *J Clin Laser Med Surg* 1997;15:275–279.
39. Spanier T, Smith CR, Burkhoff D. Angiogenesis: a possible mechanism underlying the clinical benefits of transmyocardial laser revascularization. *J Clin Laser Med Surg* 1997;15:269–273.
40. De Amicis V, Ascione R, Iannelli G, et al. Aortic valve replacement through a minimally invasive approach. *Tex Heart Inst J* 1997;24:353–355.
41. Izzat MB, Yim AP, El-Zufari MH, Khaw KS. Upper T mini-sternotomy for aortic valve operations. *Chest* 1998;114:291–294.
42. Morishita K, Kuwaki K, Sato H, Abe T. Minimal-access redo aortic valve replacement. *J Thorac Cardiovasc Surg* 1998;115:1390–1391.
43. Nair RU, Sharpe DA. Minimally invasive reversed Z sternotomy for aortic valve replacement. *Ann Thorac Surg* 1998;65:1165–1166.
44. Gundy SR, Shattuck OH, Razzouk AJ, et al. Facile minimally invasive cardiac surgery via ministernotomy. *Ann Thorac Surg* 1998;65:1100–1104.
45. Tsai FC, Lin PJ, Chang CH, et al. Video-assisted cardiac surgery. Preliminary experience in reoperative mitral valve surgery. *Chest* 1996;110:1603–1607.
46. Nair RU, Sharpe DA. Limited lower sternotomy for minimally invasive mitral valve replacement. *Ann Thorac Surg* 1998;65:273–274.
47. Chitwood WR, Jr, Wixon CL, Elbeery JR, et al. Video-assisted minimally invasive mitral valve surgery. *J Thorac Cardiovasc Surg* 1997;114:773–780.
48. Fann JI, Pompili MF, Burdon TA, et al. Minimally invasive mitral valve surgery. *Sem Thorac Cardiovasc Surg* 1997;9:320–330.
49. Cohn LH, Adams DH, Couper GS, et al. Minimally invasive cardiac valve surgery improves patient satisfaction while reducing costs of cardiac valve replacement and repair. *Ann Surg* 1997;226:421–426.
50. Levinson MM, Fonger JD. Minimally invasive atrial septal defect closure using the subxyphoid approach. *Heart Surgery Forum: A Cardiothoracic Multimedia Journal* 1998;1(1).
51. Tsuboi H, Ikeda N, Minami Y, et al. A video-assisted thoracoscopic surgical technique for interruption of patent ductus arteriosus. *Surg Today* 1997;27:439–442. ■

Lung volume reduction surgery for emphysema: the pioneering work of Otto C. Brantigan

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Chronic obstructive pulmonary disease (COPD) afflicts an estimated 14 million Americans; 1.65 million have predominately emphysema. Emphysema is the fourth leading cause of death in the United States and accounts for the loss of millions in annual health care costs.[1]

Over the years, surgeons attempted to treat emphysema by injecting helium into the abdomen, resecting ribs, or performing a glomectomy (excision of a glomus tumor) in the neck. However, none of these procedures proved helpful. In 1954, Otto C. Brantigan,[2] professor of anatomy and surgery at the University of Maryland School of Medicine and chief of surgery at Saint Joseph Hospital in Baltimore, proposed a revolutionary surgical approach for the management of pulmonary emphysema. Brantigan differentiated between primary or idiopathic obstructive pulmonary emphysema and secondary obstructive pulmonary emphysema.[3] He directed his innovative approach to primary, idiopathic, and obstructive pulmonary emphysema that diffusely involved the lungs. However, he indicated that all areas of the lungs were not involved equally by the pathologic process. The disease most frequently involved the periphery of the lobe. The lung tissue with the greatest amount of pathologic destruction is functionless as respiratory tissue. He theorized that the loss of elastic recoil surrounding small airways and its subsequent collapse during expiration, resulted in overdistention of the lungs and the thoracic cavity. In the emphysematous patient, the thorax becomes fixed in a state of full inspiration and the diaphragm is flat or depressed, leading to mechanical insufficiency. The surgical approach for primary obstructive bilateral pulmonary emphysema, with or without blebs and/or bullae, was directed at the reduction of lung volume by sacrificing lung tissue that was useless as a respiratory tissue. This would improve respiratory function by improving elastic recoil and would result in a greater radial traction on the

small airways, reducing their collapse and air trapping during expiration. He also showed that diaphragmatic and thoracic shape would approximate a more normal, and therefore more functional, configuration, improving motion and respiratory efficiency.

Dr. Brantigan performed a reduction in lung volume by resecting or plicating the areas of the lung most useless as respiratory tissue. The lung volume is reduced to fit the expiratory phase of the pleural cavity on full expiration. Every effort should be made to preserve functioning lung tissue. Therefore, segmental resections and/or lobectomy should never be performed. The reduction in lung volume brings about a higher diaphragm and permits better functioning. The thoracic cage, if still flexible, would assume a more normal position.

The second part of the operation proposed by Brantigan was denervation of the autonomic nervous system to the bronchi and lungs. The parasympathetic fibers are removed by resecting and ligating all branches of the vagus nerve, sparing the recurrent laryngeal nerve. A local sympathectomy is carried out by periarterial stripping of the pulmonary artery, peribronchial stripping of the main bronchus, and perivenous stripping of the two pulmonary veins. The pulmonary ligament was also removed. Brantigan[3] reported 89 patients with pulmonary emphysema who were studied for possible surgical therapy. The preoperative work-up included roentgenographic study with laminographs; fluoroscopy of the chest; bronchoscopy; bronchography; angiocardiography; right heart and pulmonary artery catheterization; and pulmonary function studies, namely, vital capacity, timed vital capacity, maximum breathing capacity, expiratory flow rate, blood gas studies, and pH. Of the 89 patients studied, only 56 (63%) underwent operation. Many were in a hopeless condition, being dyspneic at rest. Surgery was refused to 37% because their disease was not advanced far enough. Nine (16%) died in the postoperative period; the deaths occurred after the first operation. Fourteen patients had the operation on both sides. Only one side of the chest had been operated on in 42 patients. Three (7%) were not improved. Thirty (71%) of those who had unilateral operation were improved. Twelve (75%) who had bilateral operations were improved. Brantigan reported the symptomatic improvement of patients undergoing surgery, though this was not shown by pulmonary function studies, except for a consistent increase in vital capacity.

Brantigan's innovative operation never gained widespread use because of the significant operative mortality (16%) and the lack of sophisticated preoperative and postoperative physiologic data.

Cooper[4] reported a series of 20 patients with severe obstructive disease who underwent the Brantigan operation, with a staple resection done through median sternotomy, involving excision of 20% to 30% of the volume of each lung. The most affected portions were excised with the use of a linear stapling device and fitted with strips of bovine pericardium to buttress the staple line and eliminate air leakage. Preoperative and postoperative assessment of results included grading of dyspnea, quality of life, and exercise performance, as well as objective measurement of lung function by spirometry and plethysmography. There has been no early or late mortality and no requirement for immediate ventilatory assistance. Follow-up ranged from 1 to 15 months. The mean expiratory volume in one second had improved by 82% and the reduction in total lung capacity, residual volume, and trapped gas had been highly significant. These changes had been associated with marked relief of dyspnea and improvement in both exercise tolerance and quality of life.

In 1996, Dr. Cooper[5] extended his experiment to 150 bilateral lung volume reduction procedures for patients with severe emphysema. All patients were extubated at the end of the procedure. The 90-day mortality was 4%. Hospital stay progressively decreased with experience; the median hospital stay was seven days. Prolonged air leak was the major complication. Results at six months showed a 51% increase in the one-second forced expiratory volume and a 28% reduction in the residual volume. The $Pa0_2$ increased by an average of 8 mmHg, and 70% of the patients who had previously required supplemental oxygen no longer had this requirement. The improvement in pulmonary function tests was paralleled by a significant reduction in dyspnea and an improvement in the quality of life. The benefits were maintained at one- and two-year follow-up.

This experience has been confirmed at other centers.[6,7] Other surgical considerations were raised including whether lung volume reductions for emphysema should be unilateral or bilateral. McKenna[8] analyzed the results of 166 consecutive patients who underwent unilateral (n=87) or bilateral (n=79) thoracoscopic stapled lung volume reductions. There was no statistically significant difference in the operative mortality (3.5% vs 2.5%), mean length of stay (11.4 ± 1 vs 10.9 ± 1 days), or morbidity for the unilateral and bilateral groups, respectively. Especially compromised patients (age ≥ 75 with preoperative room air $PO_2 \leq 0$ mm Hg, or FEV, ≤ 500 ml) had the same morbidity and operative mortality with unilateral or bilateral procedures, but they had a higher one-year mortality (17% vs 5%), because of respiratory failure after the unilateral operation ($P < .001$).

Although unilateral lung volume reduction may produce excellent results in specific patients, the bilateral procedure appears to be the procedure of choice. The results of bilateral staple lung volume reduction by thoracoscopy are comparable to those of median sternotomy.

Despite the clinical and laboratory evidence for the tremendous effectiveness of lung volume reduction surgery to improve or extend the lives of patients with emphysema, the Health Care Financing Administration (HCFA) is not convinced of the published results. It has undertaken a research study cosponsored by the National Institutes of Health (NIH) involving 2,200 patients who will undergo surgery and a similar number of patients who will continue with nonsurgical therapies.

This article is testimony of the great pioneering work of a colleague who proposed a new operation 48 years ago that will alleviate the breathing problem of millions of emphysematous patients. Dr. Brantigan left us a legacy that will be cherished by surgeons and patients alike. Final vindication of the effectiveness of the Brantigan operation awaits the results of the HFCA-NIH joint study.

References

1. Higgians MW, Thom T. Incidence, prevalence and mortality: intra- and inter-county differences. *J Clinical Epidemiology of Chronic Obstructive Pulmonary Disease*, Hersley, MJ and Saunders NA, Editors. Marcel Decker, New York, 1990;23–43.
2. Brantigan OC. The surgical treatment of pulmonary emphysema. *W Virg Med Journal* 1954;50:1–7.
3. Brantigan OC, Kress MB, Muellen EA. The surgical approach to pulmonary emphysema. *Dis Chest* 1961;39:485–498.
4. Cooper JD, Trulock EP, Trianta AN, et al. Bilateral pneumonectomy (volume reduction) for chronic obstructive pulmonary disease. *J Thorac Cardiovasc Surg* 1995; 109:106–116.
5. Cooper JD, Patterson GA, Sundaresan RS, et al. Results of 150 consecutive bilateral lung volume reduction procedures in patients with severe emphysema. *J Thorac Cardiovasc Surg* 1996;112:1319–1329.
6. Sciurba FC, Rogers RM, Keenan RJ, et al. Improvement in pulmonary function and elastic recoil after lung-reduction surgery for diffuse emphysema. *N Engl J Med* 1996;334:1095–1099.
7. Miller JI, Lee RB, Mansour KA. Lung volume reduction surgery: lessons learned. *Ann Thorac Surg* 1996;61:1464–1468.
8. McKenna RJ, Brenner M, Fischel RJ, Gelb AF. Should lung volume reduction for emphysema be unilateral or bilateral? *J Thorac Cardiovasc Surg* 1996;112:1331–1338. ■

AMERICAN COLLEGE OF RETIRED PHYSICIANS FOUNDED

A group of local physicians recently formed the American College of Retired Physicians (ACORP). ACORP is dedicated to serving the needs of retired physicians and those planning to retire by providing an independent voice for this group of medical professionals. ACORP's mission incudes encouraging voluntary service, advancing legislation to protect the interests of retired physicians, facilitating continuing medical education, and sponsoring networking functions and social and cultural activities. For additional information, please phone, fax or write to ACORP at:

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Endobronchial stents: primary and adjuvant therapy for endobronchial airway obstruction

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ABSTRACT: *Endoscopic management of symptomatic tracheobronchial airway stenosis can be an important adjunct to the care of patients with malignant, benign, and lung transplantation airway complications. For most of these patients, endobronchial dilation, debridement, and/or stenting offer significant palliation and improved quality of life. The underlying etiology of the stenosis is critical in directing the most effective and safe endobronchial therapy. The use of stents in both malignant disease and lung transplantation may offer considerable symptomatic relief with minimal complications. However, the use of stents in benign disease should be reserved for inoperable patients with no other therapeutic options.*

Endobronchial management of airway obstruction was first described by Trendelenburg in 1872 and Bond in 1891 using T-tube–type stents in patients with proximal tracheal stenosis.[1,2] In 1965, Montgomery updated the design and application of T-tube stents and used them successfully in the treatment of subglottic stenosis, and as a temporizing measure in patients with tracheal malignancy.[3] The use of endobronchial stents has since been extended to include the use of nonexternalized bronchial, tracheal, and Y-stents in the treatment of malignant, benign, and lung transplantation airway stenosis. The introduction of expandable stents considerably widened the base of physicians who use endobronchial stents. Despite the wider availability and easier insertion techniques of expandable stents, indications for the use of endobronchial stents have not significantly changed, and are dependent on the underlying disease

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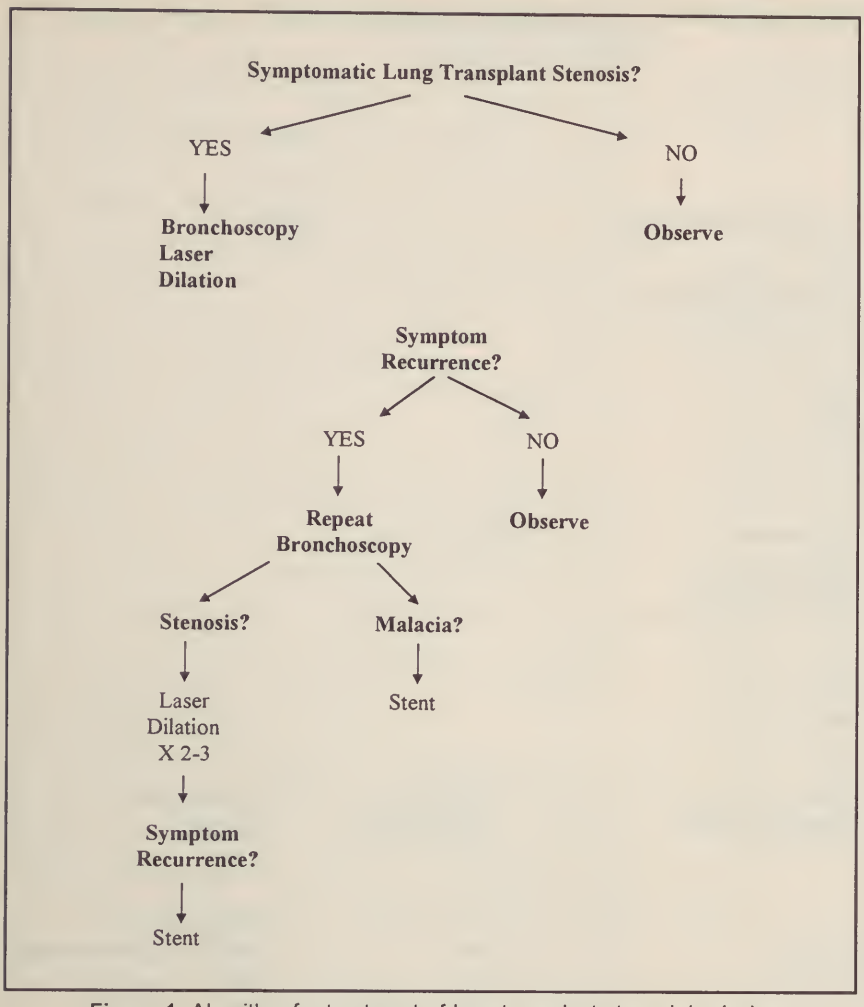

Figure 1. Algorithm for treatment of lung transplant stenosis/malacia.

causing the obstruction. The indications, results, and complications of endobronchial stents should therefore be considered in the context of either malignant, lung transplantation, or benign airway obstruction.

Choice of stents, methods, and management

The choice and mode of delivery of endobronchial stents have broadened over the past few years. There are two basic types of stents available: rigid silastic and expandable metal stents (i.e., covered and uncovered).

Silastic stents must be delivered by rigid bronchoscope; a specific insertion technique is carefully documented.[4] Rigid silastic stents have proven to be efficient and effective in the palliation of benign and malignant disease. The main advantage of the rigid silastic stent, which can be removed, is that it does not promote reactive granulation tissue formation. The disadvantages are a poor internal to external diameter ratio and a high propensity for migration and mucous plugging.

Expandable stents may be delivered by flexible bronchoscopy and fluoroscopy. They have an extremely low internal to external diameter and have no significant incidence of migration. The stents do, however, have a high propensity to cause reactive granulation tissue and may still be prone to mucous plugging. Direct tumor ingrowth through the stents has been partially mitigated by newly developed silastic covered expandable stents. The stents are clearly an improvement, but are only 75% covered in silastic, which may cause significant granulation tissue formation at the uncovered ends.

The follow-up care and management of patients with stents is extremely important. All patients with stents need to be closely followed. Patients should be maintained on nebulized inhalants to help prevent mucous plugging and will often require Mucomyst. Patients with stents for benign airway and lung transplantation stenosis should undergo routine bronchoscopic surveillance. The presence of granulation tissue or aberrant wire stent prongs should be treated with laser ablation.[5]

Results

Benign airway disease. Benign airway stenosis is frequently secondary to previous long-term intubation or trauma. The primary treatment of benign airway stenosis should be dilation and noncircumferential laser therapy. If the patient fails and symptoms persist after endobronchial laser and dilation therapy, the primary treatment should be surgical resection and reanastomosis. In benign disease stents should be reserved for patients in whom surgical therapy has failed or for those who are considered inoperable. In these patients, expandable stents may be used; however, significant and recurrent granulation tissue reaction may be expected.

With the recent advent of expandable stents, patients with severe bronchomalacia are being considered for stents. The results to date have not been encouraging: they have a low rate of complete symptom relief and high complication rate. Although stents in this population will initially palliate air flow obstruction, the inflammatory nature of this disease process results in severe granulation tissue reaction. For this reason, expandable metal stents in tracheomalacia should not be

used, and, if needed, a silastic Y-stent—Rusch stent may be considered.

Lung transplantation

Airway stricture and/or malacia as a complication of lung transplantation occur in 7% to 14 % of patients.[6] Most of these strictures are secondary to airway ischemia and present approximately 60 to 90 days after the initial transplantation. Earlier presentation of airway obstruction may represent a technical error or partial dehiscence of the anastomosis. Symptoms on presentation are primarily retained secretions and shortness of breath; however, earlier diagnosis may be made by noting a decrease in peak flow measurements.

The management of post–lung transplantation stricture and malacia may be challenging secondary to the reactive or postischemic/inflammatory nature of the airway. The use of endobronchial stents in these patients has greatly facilitated their symptom management, but may be associated with significant complications directly related to the stent.[7] For this reason, as in malignant disease, attempts at endobronchial relief without stents should first be attempted (**Figure 1**). Initial management may include laser ablation of granulation tissue and concomitant balloon dilatation. The balloon dilatation should be performed under fluoroscopic guidance with the use of a hand-held pressure delivery syringe with the psi maintained between 6 and 12.

Stenosis that is recalcitrant to laser and dilation, or has a significant malacic component, may require stenting for definitive treatment. The choice of stents, rigid silastic versus expandable, in lung transplant patients has been problematic secondary to the high complication rate of both types of stents. Silastic stents are prone to migration and mucous plugging, while expandable stents are associated with reactive granulation tissue. The relief of stenosis and symptoms has been reported to be over 90% in several series, with either rigid silastic or expandable stents, and the complication rates necessitating repeat bronchoscopies has ranged from 50% to 90% for both types of stents.[8,9]

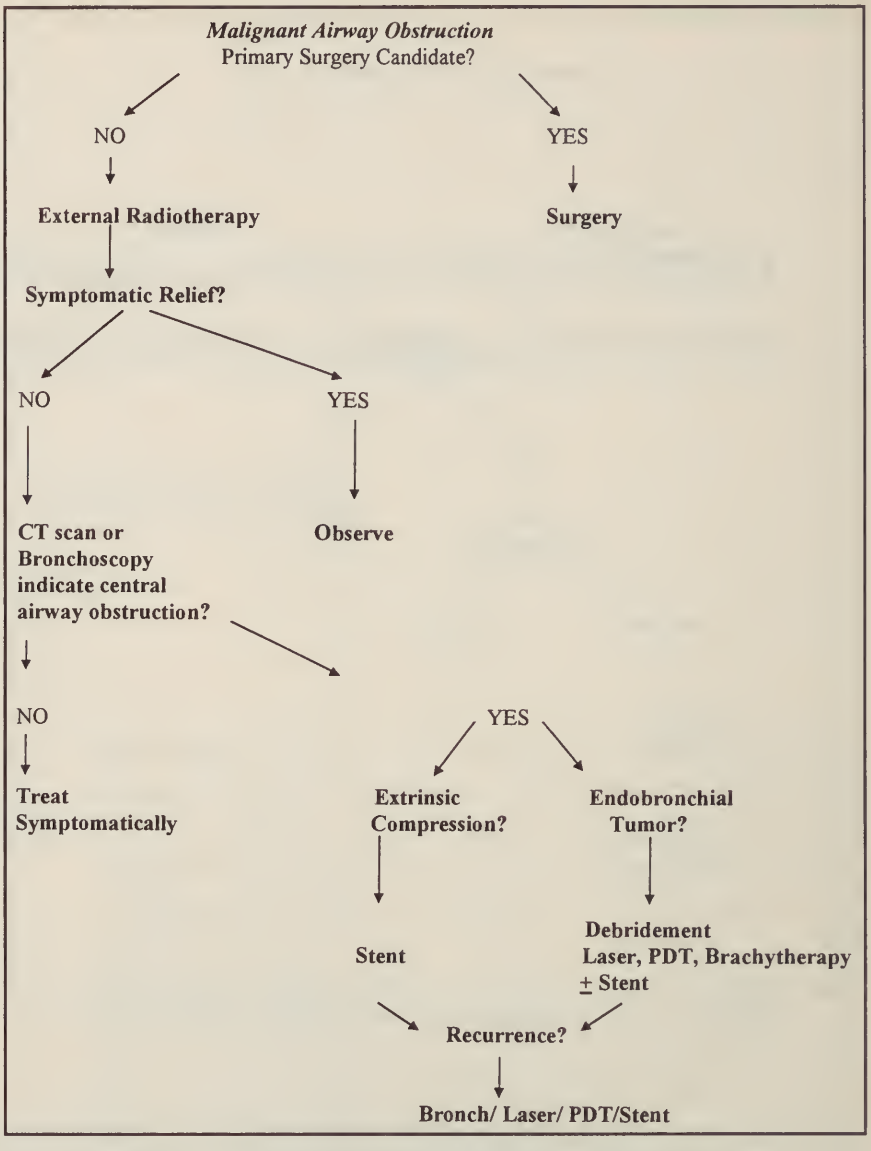

Figure 2. Treatment algorithm for patients with symptomatic malignant airway obstruction.

At the University of Maryland, 70 lung transplants (25 double, 45 single) have been performed, with only a 6% (5 patients) rate of significant airway stenosis or malacia. All patients were initially treated with balloon dilation with concomitant laser ablation of granulation tissue. One patient required no further treatment, while four patients have required stent placement. All patients received expandable stents and experienced symptom resolution and relief of their stenosis. Four of five patients receiving stents have had recurrent granulation tissue requiring multiple laser and cryotherapy ablation. Two patients have required additional stent placement secondary to recurrent stenosis.

Malignant disease

The palliative relief of endobronchial obstruction in malig-

nant disease is well documented and can significantly add to the quality of life of patients with end-stage malignancy.[4] The approach to patients with malignant airway obstruction should proceed in a stepwise systematic fashion (**Figure 2**). Utilized in combination or independently, several options can effectively palliate symptoms caused by endobronchial obstruction. These options are external beam radiation, tumor debridement, and laser therapy. Most cases with malignant endobronchial obstruction can and should be managed by noninvasive external beam radiotherapy.

Patients with persistent symptoms of airway obstruction after maximal medical treatment may be considered for endobronchial palliation. Evaluation of patients with pulmonary insufficiency and malignant airway obstruction should begin with chest x-ray and a computed tomography scan of the chest. An initial treatment of external beam radiotherapy for patients with malignant airway obstruction will not only avoid invasive endobronchial manipulations, but will also devascularize endobronchial tumor bulk, making debridement and stenting safer.

Patients in whom the primary tumor has replaced or destroyed major portions of lung parenchyma are unlikely to benefit from debridement or stenting of the airway. Patients with intact primary lung parenchyma with tracheal or bronchial obstruction, however, may dramatically improve their symptomatic status with aggressive endobronchial treatment. Patients with primarily endobronchial tumor may be palliated simply and cost-effectively with debridement alone. This may be performed by manual debridement or with the adjunct of laser or cryoablation. However, direct debridement performed with the rigid bronchoscope has been documented as the safest, quickest, and most cost-effective primary therapy.[10] At the University of Maryland we perform primary manual debridement for bulky lesions, and subsequently utilize the laser as an adjunct to complete debridement and cauterize bleeding. If no external compression exists and good luminal quality has been attained, stenting may not be necessary. However, our experience is that often a component of extraluminal compression will respond well to stenting and result in a longer period of palliation. Adjunct brachytherapy, with or without stent placement, may further benefit patients whose tumor compression and/or growth continues despite stenting. This stepwise algorithm has led to effective stenting and palliation in over 30 patients with malignant disease in our practice. All patients were discharged with palliative relief of symptoms. Length of airway palliation was dependent on the primary malignancy; however, all patients received palliative relief of their airway symptoms until the time of fatal disease progression. We have experienced no significant complications from stenting patients with malignant disease, and most procedures can be performed on an outpatient basis.

Summary

Endoscopic management of symptomatic tracheobronchial airway stenosis can be an important adjunct to the care of patients with airway obstruction. Selective use of directed laser, PDT, brachytherapy, debridement, and stenting can afford excellent palliation with minimal risk and invasiveness. The use of endobronchial airway techniques must be individualized to each patient and the patient's primary diagnosis. In benign disease, primary dilation without stenting is preferred, and stents should only be used in patients with refectory stenosis that is not amenable to surgical resection. In lung transplantation, dilation, with stenting of recurrent stenosis can afford excellent palliation, but may be complicated secondary to reactive granulation tissue. The utility of endobronchial therapy for malignant obstruction can not be overstated, quick effective palliation and relief can be afforded to these patients using laser, PDT, and stenting in a selective manner.

References

1. Trendelenburg F. Beitraege zu den operationen an den luftwegen. *Langenbecks Arch Chir* 1872;13:335.
2. Bond CJ. Note on the treatment of tracheal stenosis by a new T-shaped tracheotomy tube. *Lancet* 1891;1:539.
3. Montgomery WW. T-tube tracheal stent. *Arch Otolaryngol Head Neck Surg* 1965;82:320.
4. Sonett JR, Keenan RJ, Ferson PF, et al. Endobronchial management of benign, malignant, and lung transplantation airway stenoses. *Ann Thorac Surg* 1995;59:1417–1422.
5. Sonett JR, Krasna MJ, McLaughlin J. Laboratory and clinical laser energy requirements for endobronchial wire mesh stent manipulation and modification. *Am J Respir Crit Care Med* 1998;157:A223.
6. Shennib H, Massard G. Airway complications in lung transplantation. *Ann Thorac Surg* 1994;57:506–511.
7. Sonett JR, Conte JV, Orens J, Krasna MJ. Endobronchial wire mesh stents in benign disease: a word of caution. *Chest* 1998, in press.
8. Colt HG, Janssen JP, Dumon JF, Noirclerc JM. Endoscopic management of bronchial stenosis after double lung transplantation. *Chest* 1992;102:10–16.
9. Higgins R, McNeil K, Dennis C, et al. Airway stenoses after lung transplantation: management with expanding metal stents. *J Heart Lung Transplant* 1994;13:774–778.
10. Mathisen DJ, Grillo HC. Endoscopic relief of malignant airway obstruction. *Ann Thorac Surg* 1989;48:469–473. ■

Surgical education via the Internet: the Cardiothoracic Surgery Network

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ABSTRACT: *The Cardiothoracic Surgery Network is an international collaborative effort among cardiothoracic surgeons that provides a common platform for the exchange of information. The Cardiothoracic Surgery Network website provides peer-reviewed journals, multimedia applications, and a database repository.*

The scientific community has embraced the Internet because of its potential for international collaborative research and information sharing. Many medical specialties have produced useful websites that provide current educational information for physicians.

Traditional postgraduate medical education depended on medical societies and associations to provide the most current information for each specialty. Combined with peer-reviewed publications, annual society meetings, departmental rounds, and seminars facilitate an exchange of ideas between physicians. The Internet offers a unique platform for advanced medical education that is becoming more easily accessible and ubiquitous. The most recent information on any topic is instantly available to physicians around the world.

The Cardiothoracic Surgery Network (CTSNet — http://www.ctsnet.org) represents the potential of graduate medical education on the Web. Under the direction of editor Peter S. Greene, M.D., from the division of cardiac surgery at The Johns Hopkins Hospital, this website combines the efforts of several international cardiothoracic surgery organizations, and creates a virtual community of surgeons where new concepts and techniques can be developed. Based on the traditional concept of the surgical society and

peer-reviewed journal, CTSNet uses the Internet to integrate time-honored delivery of medical education with new technology.

Website architecture

CTSNet allows seamless integration of multiple types of software applications. The website is steered by the Information Technology Committee of the Society of Thoracic Surgery, which directs the overall structure of the site. CTSNet is formed on a database backbone that is continually updated. As information in the database is updated or expanded, corresponding areas of the website are automatically updated simultaneously. This allows for growth and development of CTSNet by multiple organizations and individuals without the time-consuming reworking of specific web pages. As the user moves through the website, each page is created on demand from the database, resulting in the delivery of the most recent information.

This database backbone provides the necessary architecture for a variety of applications that use searching functions on CTSNet. The Surgeons area, for example, is used to find information on cardiothoracic surgeons around the world and can be searched by name, country, institution, or specialty. Each surgeon has his or her own home page that displays educational background, interests, association and committee memberships.

Similarly, the Job Opportunities area allows the user to search for positions in cardiothoracic surgery or post a job opening. The Product Forum provides information about devices, companies, and industry representatives. CTSNet houses the Image Library, a digital repository, arranged by topic, of images from journals, textbooks, and surgeons' private collections. Physicians can gather images for talks or other presentations. Current information for ongoing patient research is found in the Clinical Trials section. Criteria for patient entry, principal investigators, and details of each clinical trial are available.

Organizational structure

CTSNet grew as a result of the success of the home page for the Society of Thoracic Surgery. As the original website expanded, it was clear that the potential of the web for international collaboration among cardiothoracic surgeons would be greatly enhanced and facilitated by creating a virtual community of surgeons. The CTSNet was then created as a virtual umbrella organization under which the established surgical societies could exchange information and share resources. Each society has its own domain and is responsible for developing its own society-specific content. Surgeons can gain access to the entire CTSNet infrastructure either through their society's home page or through the main CTSNet website.

This collaborative effort among the cardiothoracic surgical societies has been successful in bringing together surgeons from around the world. It is no longer necessary to travel to Europe to hear a distinguished faculty lecture or wait for a visiting professor to arrive at the home institution — the web provides a platform to read and hear the current techniques and developments of the leading authorities. The Society of Thoracic Surgery (STS) has taken the lead in this area with its annual meeting on the web. Some presentations from the annual STS meeting in January, including the presidential address, were reproduced on the web in a synchronized multimedia format. The user can listen to a digital audio file of the talk while viewing digital reproductions of the speaker's slides at the appropriate time during the presentation. Surgeons who are unable to attend society meetings can now "attend" the meeting over the Internet and gain up-to-date education without waiting for publication of the proceedings.

Society committee activity has also been enhanced by the development of secure website areas on CTSNet. Committee members can draft documents, hold discussions on the web, and "meet" more frequently. Committees can also share documents and facilitate the movement of information within a society without depending upon mass fax transmissions or mail. Society events can be streamlined through CTSNet by providing a forum for on-line meeting registration, prepublication of meeting programs and abstracts, and electronic submission of manuscripts.

On-line publications

The overall success of CTSNet has been largely due to the development of on-line peer-reviewed journals. The lifeblood of any medical society is evident in its publications, and CTSNet has thrived under the creation of the on-line versions of the two major publications in cardiothoracic surgery — the *Annals of Thoracic Surgery* and the *Journal of Thoracic and Cardiovascular Surgery*. The on-line journals contain the same articles that are in the print versions, but take advantage of features only found on the Internet.

Each journal article is integrated with the main CTSNet database and Medline. The user can hyperlink to the authors' individual home pages or access Medline abstracts from the references at the end of the article. From the Medline interface, the user can search for related articles and, if available, view

full-text versions of the articles. A searchable index of abstracts dating back to 1966 is on-line for both journals. In addition, illustrations, photographs, charts, and tables from these journal articles can be accessed from the CTSNet Image Library. This powerful journal interface expands the scope of these peer-reviewed publications by assisting surgeons in finding additional information about a particular subject.

Multimedia applications

Recent advances in multimedia technology have broadened the scope of digital audio and video transmission over the Internet. Real-time "streaming" applications send small portions of a digital multimedia file in a successive fashion, allowing the user to begin viewing or listening without waiting for the entire file to be downloaded to his or her computer. This technology is used by CTSNet.

CTSNet Grand Rounds on the web reproduce traditional surgical rounds by using synchronized audio files and digital slides. A resident provides a brief case presentation, followed by a full lecture from an expert in the field. The digital audio recordings are streamed continuously, and the digital slides are automatically updated to the screen at the appropriate time during the presentation. Full-length presentations on the current practices of leading authorities around the world run from 30 to 45 minutes. Surgeons who may never meet these experts can now hear their voices and learn their techniques at any time. Most importantly, the Grand Rounds are archived so a presentation can be viewed at a later time.

CTSNet also has digital video files for instruction and demonstration of operative techniques. In addition to the video files associated with Grand Rounds on the web, digital video may now be submitted in conjunction with articles to the peer-reviewed journals. When accepted for publication, the article includes the website address for the accompanying digital video files, which can then be accessed via the on-line journal. The surgeon can learn about new techniques by both viewing the actual operation and reading the article.

Conclusion

The rapid growth of information technology has created many new methods for medical education. Searchable database applications, on-line publications, and multimedia presentations illustrate the potential of computers for creating a virtual community of physicians. Traditional graduate medical education and specialty organizations will continue to evolve with the development of new technology on the Internet. ■

What Your Patients MAY BE READING

- Viagra!
  Here are the hard facts on the little blue pill that's taken the nation by storm.
  Men's Fitness, October 1998

- Prescription Potheads
  They're just like you — except that they're seriously sick, and the medication that keeps them going would send them to jail. Report on the medical marijuana wars.
  Mademoiselle, October 1998

- Miscarriage
  What happens when a pregnancy can't last and why.
  Glamour, October 1998

- Lean Machine
  Your body is evolutionarily adapted to store fat. Still, there are ways to cheat destiny. A comprehensive guide to the science and secrets of permanent weight loss.
  Men's Journal, October 1998

- Complete Health and Fitness Buying Guide
  Consumer's Digest, October 1998

- Clinically proven, new high-tech foods that build immunity, restore energy, and fight fat
  First for Women, September 21, 1998

- Magnets Prove Attractive for Pain Relief
  Eleven nurses had therapeutic magnets placed on their lower abdomens. The other 12 wore placebos. 'Significant' pain relief was reported by those wearing real magnets.
  Healthy and Natural Journal, October 1998

- Update: Heart abnormality may be a cause of SIDS.
  Child, September 1998

- Got Milk?
  New cloning techniques produce cows that secrete medicine in their milk.
  Popular Science, October 1998

- Doctors with Flacks
  A look at the effect of publicity-seeking physicians on quality medical care.
  Brill's Content, October 1998

Parris N. Glendening - Governor of Maryland

Martin P. Wasserman, M.D., J.D., Secretary
Department of Health & Mental Hygiene

DHMH Maryland Department of Health & Mental Hygiene

Carlessia A. Hussein, Dr. P.H., Director
Community and Public Health Administration

Diane M. Dwyer, M.D., Director
Epidemiology & Disease Control Program

EPIDEMIOLOGY AND DISEASE CONTROL PROGRAM
201 West Preston Street, Baltimore, Maryland 21201 (410) 767-6700

November, 1998
Prevention and Control of Influenza

Introduction

Public health interest in influenza derives from the rapidity with which influenza epidemics evolve and the associated morbidity and mortality. The isolation of avian influenza (A/H5N1) from humans in Hong Kong last influenza season reminded us of the pandemic potential of this constantly changing virus. In the U.S. there was widespread occurrence of influenza A/Sydney, a subtype that had not been included in last season's vaccine. This article contains a brief description of influenza virus, methods for prevention, a summary of influenza activity in Maryland for the 1997-98 influenza season, and information about influenza vaccine as presented in the Centers for Disease Control and Prevention's (CDC) Influenza Vaccine Information Statement (VIS). Copies of the VIS can be obtained from the Maryland Department of Health and Mental Hygiene (DHMH) Center for Immunization at (410) 767-6679 (or 6030). The complete recommendations of the Advisory Committee on Immunization Practices (ACIP) for the prevention and control of influenza can be found in the May 1, 1998 issue of CDC's MMWR (Morbidity and Mortality Weekly Report), Volume 47, No. RR-6. A summary of that document can be previewed (and then downloaded) from a CDC Internet site (www.cdc.gov/epo/mmwr/preview/rr4706.html) or accessed through links to the CDC on the DHMH homepage (www.dhmh.state.md.us). CDC's Internet site for general influenza information and up-to-date information on national influenza surveillance can be found at www.cdc.gov/ncidod/diseases/flu/fluvirus.html.

Influenza virus

Three types of influenza virus are recognized: A, B, and C. Both influenza A and B have been associated with widespread epidemics. Type C has been associated only with sporadic cases and localized outbreaks. Frequent viral mutation that results in the emergence of new antigenic variants necessitates annual reformulation and re-administration of influenza vaccine.

Prevention with influenza vaccine

Vaccinating persons at high risk before the influenza season (October through May) *each year* is the most effective measure for reducing the impact of influenza. Each year's influenza vaccine contains three inactivated virus strains (usually two type A and one type B) that represent the viruses believed to be most likely to circulate in the U.S. during the upcoming winter. The effectiveness of influenza vaccine varies depending on the age and immunocompetence of the vaccine recipient. When a good match exists between the vaccine and circulating stains of virus, influenza vaccine has been shown to

prevent illness in 70%-90% of healthy persons aged <65 years. Among elderly persons in nursing homes, influenza vaccine is only 30-40% effective in preventing mild illness, but it is 50-60% effective in preventing severe illness or hospitalization, and as much as 80% effective in preventing death due to influenza. Medicare reimbursement for influenza vaccination was initiated in 1993. Note that women who will be more than three months pregnant are included in the groups at increased risk for influenza-related complications and should be specially targeted for vaccination.

The 1998-99 vaccine contains antigens of A/Beijing (H1N1)-like, A/Sydney (H3N2)-like, and B/Beijing-like strains. U.S. manufacturers may substitute an antigenically equivalent B/Harbin strain (for B/Beijing) because of its better *in vitro* growth properties.

Prevention with antiviral drugs

Chemoprophylaxis is not a substitute for vaccination. The use of amantadine or rimantadine should be considered as an alternative strategy for certain individuals and groups at high risk for severe illness and complications if infected with influenza A. These agents are not effective for influenza B. See the ACIP recommendations for more complete guidance. The antiviral agents may also be used for therapy of influenza A infections and outbreak control in institutions.

Surveillance

Although individual cases of influenza are not reportable in Maryland, outbreak reporting is mandated by state regulation. DHMH maintains guidelines for case identification, reporting, and management of influenza or influenza-like illness (ILI) outbreaks in long-term care facilities (LTCFs) such as nursing homes. Influenza activity in Maryland is tracked by 1) voluntary laboratory reporting of sporadic cases, and 2) reports of influenza (and influenza-like illness) outbreaks. Laboratory confirmed influenza is defined as: a) culture of influenza A or B virus, b) direct detection of influenza A viral antigen in a respiratory specimen by enzyme immunoabsorbant assay (EIA), or c) a four-fold rise in serum antibody titer. An outbreak of influenza or ILI in a LTCF is defined as three or more clinically defined cases within a 7 day period or one laboratory confirmed case of influenza.

1997-98 Influenza Cases

During October 1997 through May 1998, DHMH received 279 reports of laboratory confirmed influenza through active surveillance involving the DHMH laboratory, several laboratories serving the Baltimore metropolitan area, and from unsolicited reports. The etiology in all 279 laboratory confirmed cases was influenza type A virus; none were influenza type B virus, (compared to the 1996-97 season when 246 were influenza type A virus and 53 were influenza type B virus).

Of the only two influenza A viruses characterized at the CDC laboratory, both were influenza A (H3N2) and antigenically similar to A/Sydney/05/97, a strain not included in the 1997-98 influenza vaccine. Most of the cases (72%) were confirmed by culture while the remaining cases (28%) were confirmed by direct antigen detection test alone.

The peak incidence of illness (as measured by the specimen collection date) occurred in January and February. The median age of cases was 27 years and 34% were aged $\geq$ 65 years. The majority (57%) of cases were female. Ninety-three (33%) of the 279 cases were associated with an outbreak of influenza.

Outbreaks of Influenza and Influenza-like illness

During the 1997-98 season, a total of 34 laboratory confirmed influenza outbreaks were reported to DHMH. In addition, 57 outbreaks of influenza-like illness were reported. The 91 outbreaks of influenza and influenza-like illness resulted in a total of 75 hospitalizations and 33 deaths. The majority of outbreaks occurred in long term care facilities.

1998-99 Laboratory-Confirmed Influenza in Maryland

A table of when and where laboratory-confirmed cases of influenza occur in Maryland during the 1998-99 season will be available on the Internet at www.dhmh.state.md.us/cpha/edcp/html/flunet.htm. You can look there to see if laboratory-confirmed influenza has recently been reported in your county.

"Prescription" for the Prevention and Control of Influenza and Influenza-Like Outbreaks in Long Term Care Facilities

■ Vaccinate residents of long term care facilities (LTCFs) prior to October 31, 1998 for the 1998/99 influenza season.

■ Vaccinate all health care workers in LTCFs prior to October 31, 1998 for the 1998/99 influenza season.

■ When a case of influenza or influenza-like illness occurs:

- restrict the case to room until the patient no longer has active symptoms
- obtain a viral throat culture for diagnosis of influenza
- consider antiviral therapy if within 48 hours of symptom onset (flu A only).
- observe roommates and health care providers for symptoms
- restrict all ill health care providers from working until they no longer have active symptoms

■ Report outbreaks of influenza and influenza-like illness within 24 hours to the local health department; an outbreak is defined as three or more clinically defined cases in a facility within a 7 day period or **one** laboratory proven case of influenza.

■ Follow health department guidelines for the control of an outbreak. Please contact your local health department for the DHMH document entitled *Guidelines for the Prevention and Control of Upper and Lower Acute Respiratory Illness (including Influenza and Pneumonia) in Long Term Care Facilities* (12/97).

■ Consider the use of amantadine and rimantadine for the treatment and prophylaxis of influenza A for residents and employees in LTCFs if there is laboratory proven influenza A in the facility or when DHMH has determined that influenza A is in the community.

■ If you have any questions regarding influenza and the above recommendations please feel free to contact the DHMH Epidemiology and Disease Control Program at 410-767-6677 or the Maryland Infection Control Hot Line (toll free) 888-258-8989.

INFLUENZA VACCINE

WHAT YOU NEED TO KNOW

1998-99

1 Why get vaccinated?

Influenza is a serious disease.

It is caused by a virus that spreads from infected persons to the nose or throat of others. The "influenza season" in the U.S. is from November to March or April each year.

Influenza can cause:

- fever
- cough
- chills
- sore throat
- headache
- muscle aches

People of any age can get influenza. Most people are ill with influenza for only a few days, but some get much sicker and may need to be hospitalized. Influenza causes thousands of deaths each year, mostly among the elderly.

Influenza vaccine can prevent influenza.

2 Influenza vaccine

The viruses that cause influenza change often. Because of this, influenza vaccine is updated each year by replacing at least one of the vaccine viruses with a newer one. This is done to make sure that influenza vaccine is as up-to-date as possible.

Protection develops 1 to 2 weeks after the shot and may last up to a year.

3 Who should get influenza vaccine?

People at risk for getting a serious case of influenza or complications – or people in close contact with them – should get the vaccine. These include:

- Everyone 65 years of age or older.
- Residents of long term care facilities housing persons with chronic medical conditions.
- Anyone who has a serious long-term health problem with:
  - heart disease
  - lung disease
  - asthma
  - kidney disease
  - metabolic disease, such as diabetes
  - anemia, and other blood disorders
- Anyone whose immune system is weakened because of:
  - HIV/AIDS or other diseases that affect the immune system
  - treatment with drugs such as long-term steroids
  - cancer treatment with x-rays or drugs
- Anyone 6 months to 18 years of age on long-term aspirin treatment (who could develop Reye Syndrome if they catch influenza).
- Women who will be more than 3 months pregnant during the influenza season.
- Physicians, nurses, or anyone else coming in close contact with people at risk of serious influenza

Others who should consider getting influenza vaccine include:

- People who provide essential community services
- Travelers to the Southern hemisphere between April and September, or those traveling to the tropics any time
- Students and staff at schools and colleges, to prevent outbreaks
- Anyone who wants to reduce their chance of catching influenza

4 When should I get influenza vaccine?

The best time to get influenza vaccine is between September and December. A new shot is needed each year.

- People 9 years of age and older need ***one shot***.
- Children less than 9 years old may need ***two shots***, given one month apart.

Influenza vaccine can be given at the same time as other vaccines, including pneumococcal vaccine.

5 Can I get influenza even though I get the vaccine this year?

Yes. Influenza viruses change often, and they might not always be covered by the vaccine. But people who *do* get influenza despite being vaccinated often have a milder case than those who did not get the shot.

Also, to many people "the flu" is any illness with fever and cold symptoms. They may expect influenza vaccine to prevent these illnesses. But influenza vaccine is effective only against illness caused by influenza viruses, and not against other causes of fever and colds.

6 Some people should consult with a doctor before getting influenza vaccine.

Consult with a doctor before getting an influenza vaccination if you:

1) ever had a serious allergic reaction to *eggs* or a *previous dose of influenza vaccine*
   or
2) have a history of Guillain-Barré Syndrome (GBS).

If you are moderately or severely ill at the time the shot is scheduled you should usually wait until you recover before getting influenza vaccine. Talk to your doctor or nurse about rescheduling the vaccination.

7 What are the risks from influenza vaccine?

A vaccine, like any medicine, is capable of causing serious problems, such as severe allergic reactions. The risk of a vaccine causing serious harm, or death, is extremely small. Almost all people who get influenza vaccine have no serious problems from it. The viruses in the vaccine are killed, so you cannot get influenza from the vaccine.

Mild problems:

- soreness, redness, or swelling where the shot was given
- fever
- aches

If these problems occur, they usually begin soon after the shot and last 1-2 days.

Severe problems:

- Life-threatening allergic reactions are very rare. If they do occur, it is within a few minutes to a few hours after the shot.

- In 1976, swine flu vaccine was associated with a severe paralytic illness called Guillain-Barré Syndrome (GBS). Influenza vaccines since then have not been clearly linked to GBS. However, if there *is* a risk of GBS from current influenza vaccines it is estimated at 1 or 2 cases per million persons vaccinated – much less than the risk of severe influenza, which can be prevented by vaccination.

8 What if there is a moderate or severe reaction?

What should I look for?

- Any unusual condition, such as a high fever or behavior changes. Signs of a serious allergic reaction can include difficulty breathing, hoarseness or wheezing, hives, paleness, weakness, a fast heart beat or dizziness.

What should I do?

- Call a doctor, or get the person to a doctor right away.
- Tell your doctor what happened, the date and time it happened, and when the vaccination was given.
- Ask your doctor, nurse, or health department to file a Vaccine Adverse Event Reporting System (VAERS) form, or call VAERS yourself at **1-800-822-7967.**

9 How can I learn more?

- Ask your doctor or nurse. They can give you the vaccine package insert or suggest other sources of information.

- Call your local or state health department.

- Contact the Centers for Disease Control and Prevention (CDC):
  - -Call **1-800-232-2522** (English)
  - -Call **1-800-232-0233** (Español)
  - -Visit the National Immunization Program's website at **http:/www.cdc.gov/nip**

Influenza - 7/1/98
Vaccine Information Statement

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
Centers for Disease Control and Prevention
National Immunization Program

Conjunctivitis ("Pink Eye") Fact Sheet

Conjunctivitis is an infection of the eyes commonly known as "pink eye"

It is most often caused by a virus but can also be caused by bacteria.

Symptoms of the eye include:

- Redness, irritation
- Itchiness; may produce lots of tears and discharge (clear or yellow)
- Discharge may make the eyelids and eyelashes stick together, especially in the morning

The tears or the discharges from the eye are infectious

People can get conjunctivitis by coming into contact with the tears or discharges from the eyes of an infected person and then touching their own eyes. Also conjunctivitis, when associated with an upper respiratory infection, can spread by droplets (e.g., coughing, sneezing).

Anyone can catch conjunctivitis

Preschoolers and school-age children get it most often because of crowding and lack of hygiene.

Conjunctivitis is usually a mild illness

Viral conjunctivitis will go away by itself in one to six weeks. Yellow pus may be a sign of infection by bacteria in addition to a viral infection. Intense foreign body sensation and blurred vision are signs of more severe disease.

An eye medication is available

Doctors may give an antibiotic eye medication in case the cause is bacterial. There is no curative treatment for common viral conjunctivitis. Supportive therapy with lid hygiene and lubricating eye drops sometimes helps.

People with conjunctivitis should:

- Wash their hands after touching or wiping their eyes
- Avoid touching other people's eyes
- Throw away or carefully wash items that touch their eyes
- Do not share eye make up or other items used on their eyes (for example, towels, or tissues)
- See a doctor in case you need medication
- Cover mouth when coughing and sneezing

Head Lice Fact Sheet

Head lice are small insects

They live on the hair and scalp of humans where they feed on blood.

Anyone can get head lice

You can catch head lice by coming in direct contact with an infested person's head or with personal belongings such as combs, brushes, and hats. Head lice can spread as long as lice or eggs remain alive on the infested person or clothing. Pets (dogs and cats) do not catch head lice.

Itching of the head and neck is common with head lice

Itching may be mild to intense. Other signs to look for can sometimes include swelling of neck glands, fever, or muscle aches.

Head lice are diagnosed by the presence of adult lice or eggs

Lice may be difficult to see, but nits (eggs) may be seen as specks "glued" to the hair shaft. Nits range in color from yellow to grey.

Head lice can be treated

Medicated shampoos or creme rinses kill lice. Permethrin-based drugs (such as Nix) are the treatment of choice and may be purchased over-the-counter. Follow package directions closely. Fine-toothed combs are available to help remove nits from hair. Wash hats, scarves, clothing, towels and bed linen in hot water and dry in a hot dryer. Tie up non-washable items in a plastic bag for 10 days. Wash combs and brushes with a disinfectant and hot water.

Spraying classrooms or homes with insecticides is not recommended

Floors, rugs, pillows, and upholstered furniture should be vacuumed. The lice die when they are away from the warmth of a human body for more than 48 hours.

Infestations can be prevented

- Avoid physical contact with a person who has lice
- Do not share combs, brushes, hats, scarves, ribbons, or other personal items
- Household members and close contacts of a person with head lice should be examined and treated if they are infested
- Exclude children with head lice from school or day care until the morning after treatment

Impetigo Fact Sheet

Impetigo is a common skin infection in young children

It is caused by streptococcal or staphylococcal bacteria.

A rash appears 4 to 10 days after exposure

The rash looks red and round, and may be oozing. It can occur as small blisters containing pus-like material that may break and form a flat, honey-colored crust. The rash is most commonly seen on the face and around the mouth, but can occur any place on the skin. It is often itchy.

Impetigo is spread through direct contact with infected skin

Less commonly it can be spread through touching articles (such as clothing, bedding, towels, etc.) contaminated with the blisters.

A person with impetigo should:

- Wash the rash with soap and water and cover it loosely with gauze, a bandage, or clothing
- Wash hands thoroughly, especially after touching an infected area of the body
- Use separate towels and washcloths
- Avoid contact with newborn babies
- Be excluded from school or day care until 24 hours after the start of treatment
- Be excluded from foodhandling until 24 hours after the start of treatment

Treatment is available

Topical treatments and/or antibiotics are available. See your doctor.

The Johns Hopkins Medical Institutions

All courses at the Thomas B. Turner Building unless otherwise indicated. For information on continuing medical education activities, contact the Office of Continuing Medical Education, 720 Rutland Ave., Baltimore, MD 21205, 410-955-2959, Fax 410-955-0807 (e-mail: cmenet@som.adm.jhu.edu).

40th annual Emil Novak Memorial Course, gynecology, gynecological pathology, endocrinology, and high risk obstetrics, sponsored by the department of obstetrics and gynecology, Johns Hopkins Medical Institutions, at Renaissance Harborplace Hotel, Baltimore. Credits: 45 Cat 1 AMA credits. Fee: $950/physicians; $750/residents, fellows, and allied health professionals. **Oct. 17–22**

Ophthalmology for the pediatrician, sponsored by the Wilmer Ophthalmological Institute of Johns Hopkins, division of pediatric ophthalmology and strabismus. Credits: Up to 6 Cat 1 AMA credits. Fee: $130/physicians; $100/residents, fellows, allied health professionals. **Oct. 23**

Lipid disorders training programs – advanced update, sponsored by Johns Hopkins University School of Medicine and Johns Hopkins Lipid Clinic. Credits: 5.5 Cat 1 AMA credits. **Oct. 24**

Advances in pediatric nutrition, sponsored by the division of pediatric gastroenterology and nutrition, department of pediatrics, Johns Hopkins University School of Medicine, at the Renaissance Harborplace Hotel, Baltimore. Fee: $275/physicians; $220/residents, other health professionals. **Nov. 2–4**

Advanced pediatric life support courses, sponsored by the Johns Hopkins University School of Medicine and the Johns Hopkins Pediatric Trauma Center. Credit: up to 21 Cat 1 AMA credits. Fee: $650. **Nov. 9–11**

Computed body tomography for the technologist state of the art, sponsored by Johns Hopkins University School of Medicine Department of Radiology, at the Peabody Orlando Hotel, Orlando, Florida. Credits: 19.5 Cat 1 AMA credits. Fee: $475. **Nov. 12–15**

Clinical research: improving the process, sponosred by the Johns Hopkins University School of Medicine. Credits: Up to 11 Cat 1 AMA credits. Fee: $350/physicians; $295/residents, fellows, allied health professionals. **Dec. 3–4**

Topics in ambulatory medicine IX, sponsored by Johns Hopkins University School of Medicine and Johns Hopkins Bayview Medical Center, at the Renaissance Harborplace Hotel, Baltimore. Fee: $550/physicians; $325/residents, fellows, and allied health professionals. **Dec. 7–9**

16th annual medical and surgical gastroenterology: a multidisciplinary approach, sponsored by the Johns Hopkins University School of Medicine and the Johns Hopkins Gallstone and Biliary Disease Center, at The Lodges at Deer Valley, Utah. Credits: 18 Cat 1 AMA credits. Fee: $545/physicians, $425/residents, fellows, allied health professionals. **Jan. 31–Feb. 5**

University of Maryland School of Medicine

For each course, additional information may be obtained by contacting the Program of Continuing Education, University of Maryland School of Medicine, Room 12-011, BRB, 655 W. Baltimore St., Batlimore, MD 21201 (410-706-3959), or by calling the phone number listed after a specific program. Fax 410-706-3103.

Glaucoma update at Camden Yards, sponsored by the Maryland Center for Eye Care, University of Maryland School of Medicine, Baltimore. CME credits available. Fee: $150/M.D.s, Ph.D.s, O.D.s; $65/residents; $85/fellows. Info: Nancy Cook, 410-328-5929, Fax: 410-328-6346; email: ncook@aol.com. **Feb. 26**

Miscellaneous

The missed or delayed diagnosis of breast cancer, sponsored by the International Institute for Continuing Medical Education, Inc., at The Four Seasons Hotel, Atlanta, Georgia. Credits: 18 Cat 1 AMA credits. Fee: $695/physicians; $450/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Oct. 15–18**

Bringing care-givers closer to the patients – a wish-list for the 21st century, sponsored by the Atlantic City Medical Center, at the Sheraton Atlantic City Convention City Hotel. Fee: $100. Info: 609-569-7889, fax: 215-233-4874. **Oct. 16**

New techniques in urinary incontinence and female urology, sponsored by the division of urologic surgery and the Office of Continuing Medical Education, Washington University School of Medicine, St. Louis, Missouri, at the Eric P. Newman Education Center, St. Louis. Credits: Up to 8 Cat 1 AMA credits. Fee: $250/physicians; $150/physician-in-training, allied health professionals, Washington University staff. Info: 314-362-6891 or 1-800-325-9862, fax: 314-362-1087, email: cme@msnotes.wustl.edu. **Oct. 17**

Bridging canyons to the 21st century, sponsored by the American College of Occupational and Environmental Medicine, at the Pointe Hilton Resort at Tapatio Cliffs, Phoenix, Arizona. Info: 847-228-6850, ext. 184, fax: 847-228-1856, website: www.acoem.org. **Oct. 18–22**

New techniques and concepts in cardiology, sponsored by the American College of Cardiology, at The Capital Hilton, Washington, DC. Credits: 16 Cat 1 AMA credits. Info: 800-253-4636, ext. 695 (301-897-5400, ext. 695 outside the U.S.), fax: 301-897-9745. **Oct. 22–24**

Advances in obstetrics and gynecology, sponsored by the Office of Continuing Medical Education, Virginia Commonwealth University, Medical College of Virginia Campus, at the Omni Richmond Hotel, Richmond, Virginia. Info: Nancie Mervis, 1-800-413-2872 or 804-828-8640, fax: 804-828-7438. **Oct. 22–24**

Musculoskeletal MR, sponsored by the University of California, San Diego, School of Medicine, at the Westin Resort Hotel, Hilton Head, South Carolina. Credits: 18 Cat 1 AMA credits. Fee: $650/physicians, $450/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Oct. 22–25**

18th annual comprehensive review of vascular and interventional radiology, sponsored by the University of California, San Diego, School of Medicine, at the Hotel Del Coronado, San Diego, California. Credits: 19 Cat 1 AMA credits. Fee: $500/physicians, $300/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Oct. 23–25**

23rd annual San Diego postgraduate radiology review course, sponsored by the University of California, San Diego, School of Medicine, at the Hotel Del Coronado, San Diego, California. Credits: 39 Cat 1 AMA credits. Fee: $995/physicians; $700/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Oct. 26–Nov. 1**

25th annual recent advances in clinical medicine, sponsored by the University of Virginia, Office of CME, at the Omni Charlottesville Hotel, Charlottesville, VA. Credits: 20 Cat 1 AMA credits. Fee: $375. Info: 804-924-5318, Fax: 804-982-1415. **Oct. 28–30**

2nd annual intensive review of neuro, head, and neck radiology, sponsored by the University of California, Irvine, at the Four Seasons Resort Hotel, Newport Beach, California. Credits: 28 Cat 1 AMA credits. Fee: $725/physicians, $450/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Oct. 29–Nov. 1**

Miscellaneous (continued)

3rd annual fingers to toes: comprehensive orthopaedic review course for primary care physicians, sponsored by the Office of Continuing Medical Education, Washington University School of Medicine, St. Louis, Missouri. Info: 314-362-6891 or 1-800-325-9862, fax: 314-362-1087, email: cme@msnotes.wustl.edu. — **Oct. 30–31**

Breast imaging and interventions update, sponsored by the University of California, San Diego, at the Hotel Del Coronado, San Diego, California. Credits: 15 Cat 1 AMA credits. Fee: $450/physicians, $275/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. — **Oct. 30–Nov. 1**

Breast imaging today and tomorrow, sponsored by the International Institute for Continuing Medical Education, at the Ritz Carlton Resort Hotel, Naples, Florida. Credits: 26 Cat 1 AMA credits. Fee: $650/physicians, $450/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. — **Nov. 2–5**

Minimally invasive surgery at the millennium, sponsored by the Washington University School of Medicine, at the Eric P. Newman Education Center, Washington University Medical Center, St. Louis, Missouri. Credits: 14.5 Cat 1 AMA credits. Fee: $300/physician; $150/physician-in-training, allied health professionals, WUMS full and part time staff. Info: Washington University School of Medicine, CME, Campus Box 8063, 660 South Euclid Ave., St. Louis, MO 63110, Fax: 314-362-1087. — **Nov. 6–7**

MARCOM II, second annual mid-atlantic regional conference on occupational medicine, sponsored by the Office of Continuing Medical Education, Virginia Commonwealth University, Medical College of Virginia Campus, at the Williamsburg Hospitality House, Williamsburg, Virginia. Info: Nancie Mervis, 1-800-413-2872 or 804-828-8640, fax: 804-828-7438. — **Nov. 13–15**

The impact of technology on consultation-liaison psychiatry, sponsored by the Academy of Psychosomatic Medicine, at the Buena Vista Hotel, Buena Vista, Florida. Info: 773-784-2025, fax: 773-784-1304, email: apsychmed@aol.com. — **Nov. 19–22**

4th annual sports medicine for the primary care physician, sponsored by the Office of Continuing Medical Education, Virginia Commonwealth University, Medical College of Virginia Campus, at the Williamsburg Hospitality House, Williamsburg, Virginia. Info: Nancie Mervis, 1-800-413-2872 or 804-828-8640, fax: 804-828-7438. — **Dec. 4–6**

15th annual CME clinical update in pulmonary medicine, sponsored by the Center for Bio-Medical Communication, at the Atlantic City Convention Center, Atlantic City, New Jersey. Credits: 6.75 Cat 1 AMA credits. Fee: $225/physicians; $130/allied health professionals, physicians-in-training. Info: 201-342-5300, Fax: 201-342-7555, email: http://www.alzheimers.org/adear — **Dec. 5**

26th annual Williamsburg conference on heart disease, sponsored by the American College of Cardiology, at the Williamsburg Lodge, Williamsburg, Virginia. Credits: 18.5 Cat 1 AMA credits. Info: 800-253-4636, ext. 695, Fax: 301-897-9745. — **Dec. 6–9**

Contemporary management of acute myocardial infarction, sponsored by the Office of Continuing Medical Education, Washington University School of Medicine, St. Louis, Missouri. Info: 314-362-6891 or 1-800-325-9862, fax: 314-362-1087, email: cme@msnotes.wustl.edu. — **Dec. 12**

MRI at Snowbird, sponsored by The University of California, San Diego, at Cliff Lodge, Snowbird, Utah. Credits: approx. 20 Cat 1 AMA credits. Fee: $650/physicians; $400/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. — **Jan. 6–10**

PHYSICIAN'S RECOGNITION AWARD

For the months of March-July 1998, the physicians listed below received the American Medical Association (AMA) Physician's Recognition Award. Established in 1968, the award's purpose is to encourage physician participation in continuing medical education and to recognize those physicians who have voluntarily completed programs of continuing medical education.

Theran Bradford Adamson
Sook Hee Ahn
Hasan B. Alam
Kandasamy Ambalavanar
Sheena La-Shun Antonio
Rosemary Isabel Ashman
Chan Aung
James Russell Banks
Wayne Leslie Barber
Sylvia Josephine Batong
Melinda June Battaile
Jodi Helene Bayley
Douglas Preston Beall
Ozlem Ayse Belen
Gershon Henoch Bergeisen
Sanders Harris Berk
Helaine F. Bertsch
Belur S. Bhagavan
Vipulkumar P. Bhalodiya
Sulaiman Ahmed Bham
Harsh Bhushan
Steven Billet
Wisit Boonn
Kestutis Paul Boyev
Linnea R. Boyev
Daniel P. Boyle
Robert J. Branton
James Brown
Patricia Church Brown
Susan Carol Brunsell
Barbara Diane Buch
Joseph Frederick Buell
Alisa Beth Busch
Robert E. Butler
William Russell Byrne
Stephen Patrick Cafferty
Anthony Jos Calabrese
Anthony B. Campbell
John R. Carbon
William A. Cassidy
Miguel Albano Castro
James Catevenis
Patricia Pat-Yue Chang
Thomas Chang
Amita Chaudhary
Howard Drew Chazin
Julius David Cheng
Judith M. Chertoff
Lee Robert Chookang
Camille Deborah Coates
Marilyn Eilleen Conlon
Joseph P. Connelly
Kevin Patrick Connolly
Jesse Rey N Consing
Ephrem Daniel
William C. Davis
Rosita Hao Dee
Samuel Del Rio
Kirk David Denicoff
Josephine E. Dennis
Anand Mohan Dhanda
Carolyn S. Donovan
Albert H. Dudley
Wieslawa Dziedzic
Donald C. Egbuonu
Gerald Felsenthal
Bernard Jos Ficarra
Sherahe B. Fitzpatrick
Cheryl Ann Focht
Max Chmiel Frank
Christopher F. Freer
Mayo Frederick Friedlis
Christian F. Gaissmaier
Zhen-Ya Gao
Carolyn Marie Garrett
Joseph Antoun Gebeily
Steven Andrew Geller
Thomas Genuit
Linda Lee George
Nicholas Peter Georges
Gary Gerstenblith
Thomas Joseph Ghiorzi
William C. Golden
Richard Lee Gross
John Arthur Gschwend
Rohit Gulati
James L. Gulley
Neeru Gupta
Kymberly Anne Gyure
Linda Frances Habeeb
Helen Holly Hackman
Djavid Hadian
William Hakkarinen
Derek Blaine Hamblin
Christian C. Haudenschild
Karl Derek Hawver
Philip Bruce Heard
Thomas Anthony Hennebry
Kathleen Ann Hickey
Barbara Highman
Jon Mark Hirshon
William Robert Hobbs
Sonia Hodge
Lewis Herbert Hogge
Pauline Hsu
Tint Htwe
Azher Hussain
Naaz Ajaz Hussain
Ayne Kimberly Iafolla
Okeowo Darcy Ibitoye
Rafi Q. Iqbal
Mahmood Jaberi
Howard John Jacobson
Lorraine Fay Jarrah
Thomas Gregory Johnson
M.A. Johnson-Crockett
Pornchai Jonglertham
Thomas Edgar Jordan
Vilma Angella Joseph
Meredith Susan Josephs
Douglas Biron Kamerow
Paul Byungkuk Kang
Bruce Allen Kaup
Mohammad J. Kaviani
Karin Yount Kent
Shin Eung Kim
Dawan Vanessa King
Robert Stanley Knight
Grace Kobusingye
Ingrid C. Kohlstadt
Herbert Louis Kotz
Scott Daniel Krugman
Helen Mary Kupinsky
Edward Wm Lampton
Richard Collison Lang
David Ross Larach
Gwendolyn Ruby Lee
Shirley Suili Lee
David E. Lees
Peter John Leider
Peter Leon
Christopher S. Levey
Ann E. Lewandowski
Barry Lydell Lewis
Gang Li
Katharine Anne Lillie
Hsiaohui Lin
Robert Wheeler Lisle
Samuel Meiching Liu
Raymond A. Lloyd
Paul Lomonico
Markham C. Luke
Csaba Ladislao Magassy
Vivek Tim Malhotra
Allen E. Marans
Agata Marriott
Maria Luisa Marquez
Robert Bryan Mason
Martha Jane Matjasko
Allison Lynne McCarley
Kevin Edward McGovern
Larry McGowan
Darrell Winfred McIndoe
Munisha Mehra
Shannon Corey Miller
Kamrudin K. Mithani
Faranak E. Moghadam
Bahador Momeni
Michael Monias
Claude T. Moorman
J. Margaret Moresi
Ted Olin Morgan
Alan Richard Morrison
Rafik David Muawwad
Jai Kumar Nahar
David V. Nasrallah
Michael Jay Nelson
Jose P. Nepomuceno
James F. Neuenschwander
Stephanie Jean Neukum
James An Nguyen
Thanh Huu Nguyen
Barbara B. Niklinska
Chiazo Chioma Nnawuchi
Paul Taylor Noone
A. Frederick North
Catherine A. North
Gabriel Okechukwn Obiadi
Omobola Adeola Olaniyan
Richard M. Oley
Dmitry Orlov
Sisom Osia
Anne Owusu
Maria Elena Pace
Hamang Manubhai Patel
W.J. Pawlak
Frederick Norman Pearson
Jay Buhay Penafiel
Robert Stephen Perlstein
Vincent Jos Perrotta
Silvia Picciafuoco
Vsevolod Y. Polotsky

continued on next page

Miscellaneous (continued)

7th annual musculoskeletal MR course, sponsored by the University of California, San Diego, at the Ritz-Carlton Resort Hotel, West Palm Beach, Florida. Credits: 22.5 Cat 1 AMA credits. Fee: $695/physicians; $450/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Jan. 18–22**

Breast imaging today and tomorrow, sponsored by The International Institute for Continuing Medical Education, Inc., at Boca Raton Resort and Club, Boca Raton, Florida. Credits: 23 Cat 1 AMA credits. Fee: $695/physicians; $495/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Jan. 25–28**

5th annual neuroradiology: a comprehensive review, sponsored by the University of California, San Diego, at The Ritz-Carlton Resort Hotel, West Palm Beach, Florida. Credits: 24 Cat 1 AMA credits. Fee: $695/physicians; $450/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Feb. 2–6**

Annual meeting and course: international spine imaging symposium, sponsored by the University of Texas, San Antonio and the American Society of Spine Radiology, at the Registry Resort, Naples, Florida. Credits: 19.5 Cat 1 AMA credits. Fee: $250/physicians; $350/ASSR members; $650/non-ASSR members. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Feb. 15–17**

Breast imaging today and tomorrow, sponsored by the International Institute for Continuing Medical Education, Inc., at the Buena Vista Palace Resort and Spa, Lake Buena Vista, Florida. Credits: 23 Cat 1 AMA credits. Fee: $695/physicians; $495/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. **Feb. 15–19**

Up-to-date radiology in the desert, sponsored by the University of California, Irvine Medical Center, at the Mira Monte Resort, Indian Wells, California. Credit: 26 Cat 1 AMA credits. Fee: $750/physicians; $495/residents, fellows, technologists. Info: Ryals & Associates, 770-641-9773, Fax: 770-552-9859, email: webmaster@ryalsmeet.com. Feb. 25-28 **Feb. 25–28**

PHYSICIAN'S RECOGNITION AWARD

cont.

Ulka Prakash
Peter Sartell Prentice
Shannon Penick Pryor
Scott Allen Raber
Thomas Gilman Rainey
Sinnarajah Raguraj
Michael S. Ramjattansingh
Jeevindra Singh Rana
Uma Rani
Sheila Yvonne Rao
Rachel Lynn Rennert
Harvey Wm Rice
Scott Alan Riise
Donald Cornelius Roane
Martin S. Roberts
Alan Ellis Rolfe
Leo Charles Rotello
Karen Elizabeth Ruthman
Ronald Caesar Sabbagh
Mona Sadek
Qaisra Yasmin Saeed
Madelaine Ramos Saldivar
Donald Irwin Saltzman
Carol L. Samuels-Botts
Kulbir Sandhu
Pavanjit Kaur Sawhney
Edward W. Schaefer
Theodore William Schafer
Marc Stephen Scheiner
John Thomas Schindler
Frederic Tovi Schwartz
Toni K. Sciolto-Morrissey
Paul E. Segal
Louis Semenoff
Saba Adel Shamoon
James Henry Shelhamer
Anne Margaret Shewan
John Jos Shigo
John Andrew Shutta
Maria P. Sicilia
Ziad C. Sifri
Larry Bernard Silver
Steven Robt Simmerman
Kenneth Lee Sisco
David Phillips Smack
Lamont Charles Smith
John Wm Skouge
Lijun Song
Marya Sonny
Martin Peter Sorensen
Michael William Stasko
Nanette Irene Steinle
Gerald Paul Sterner
Gilbert Tetteh Tamakloe
Angelo Peter Tanna
Shahram Taei Tehrani
Radu M. Theodoru
Donald E. Thomas
James Sharon Thompson
Jackson Tsai
Marc Wayne Urquhart
Anton Van Duuren
Radhika Vij
Jonathan Chas Vogan
James Edmond Vogel
Joseph J. Wallace
Earl Cheng Wang
Michael Meihwa Wang
Alan R. Weinstock
Jeffrey Bennett Wetstone
Mary Elizabeth Wheeler
Charles H. Wirth
Lihteh Wu
Eleonor F. Yabut
Abutaher M. Yahia
Kae Strosnider Yingling
Pedro Jose Zaiter
Kenton James Zehr
Jianyi Zhang
Ingrid E. Zimmer-Galler
Kevin Michael Zitnay

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